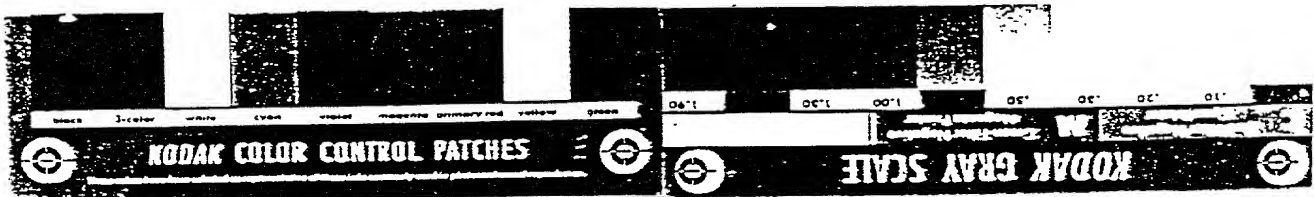


Fig. 1

Color comparison of various passive layers



Substrate: Zinc-plated screws

Blue chromation:	Left picture half
Invention:	Center
Yellow chromation:	Right picture half

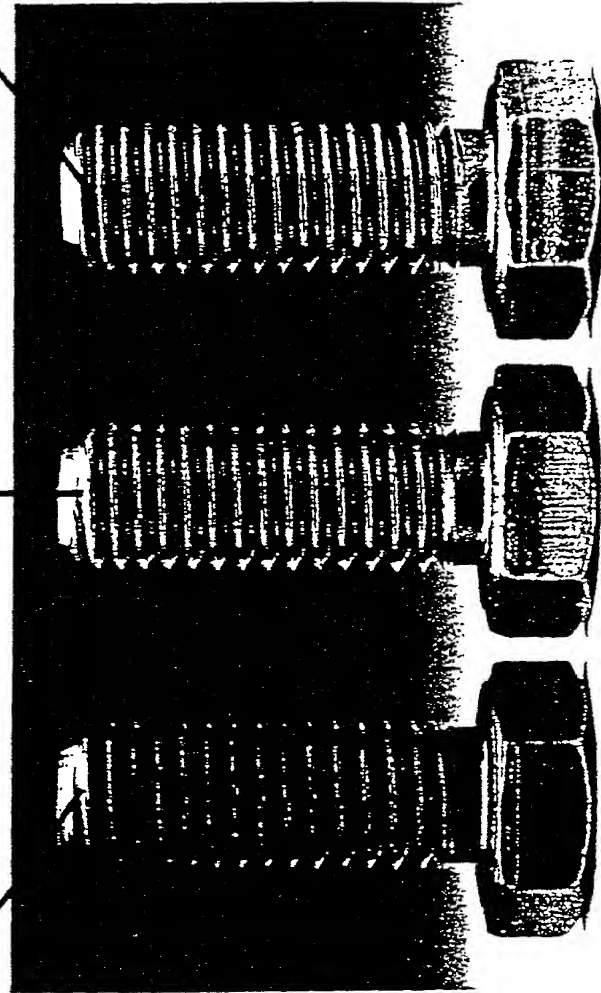
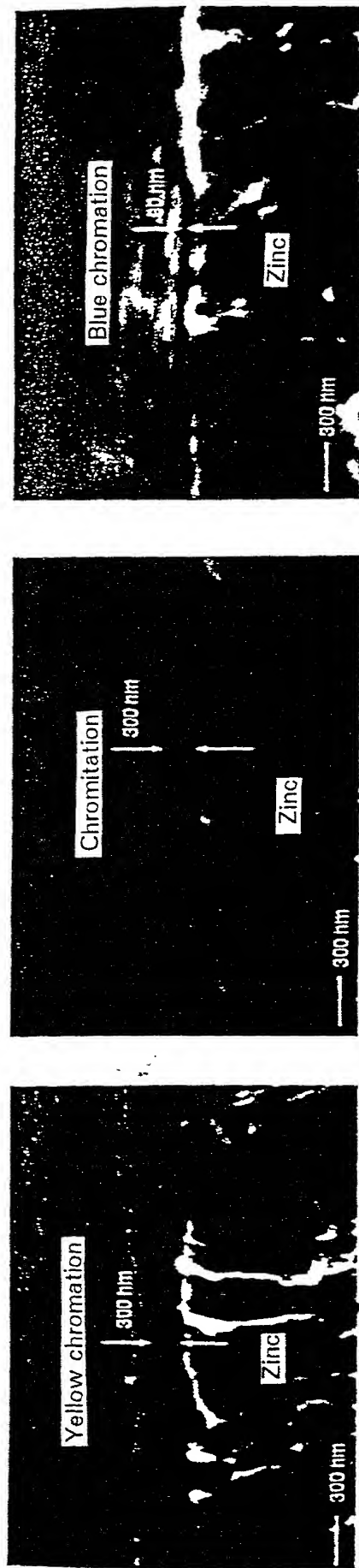
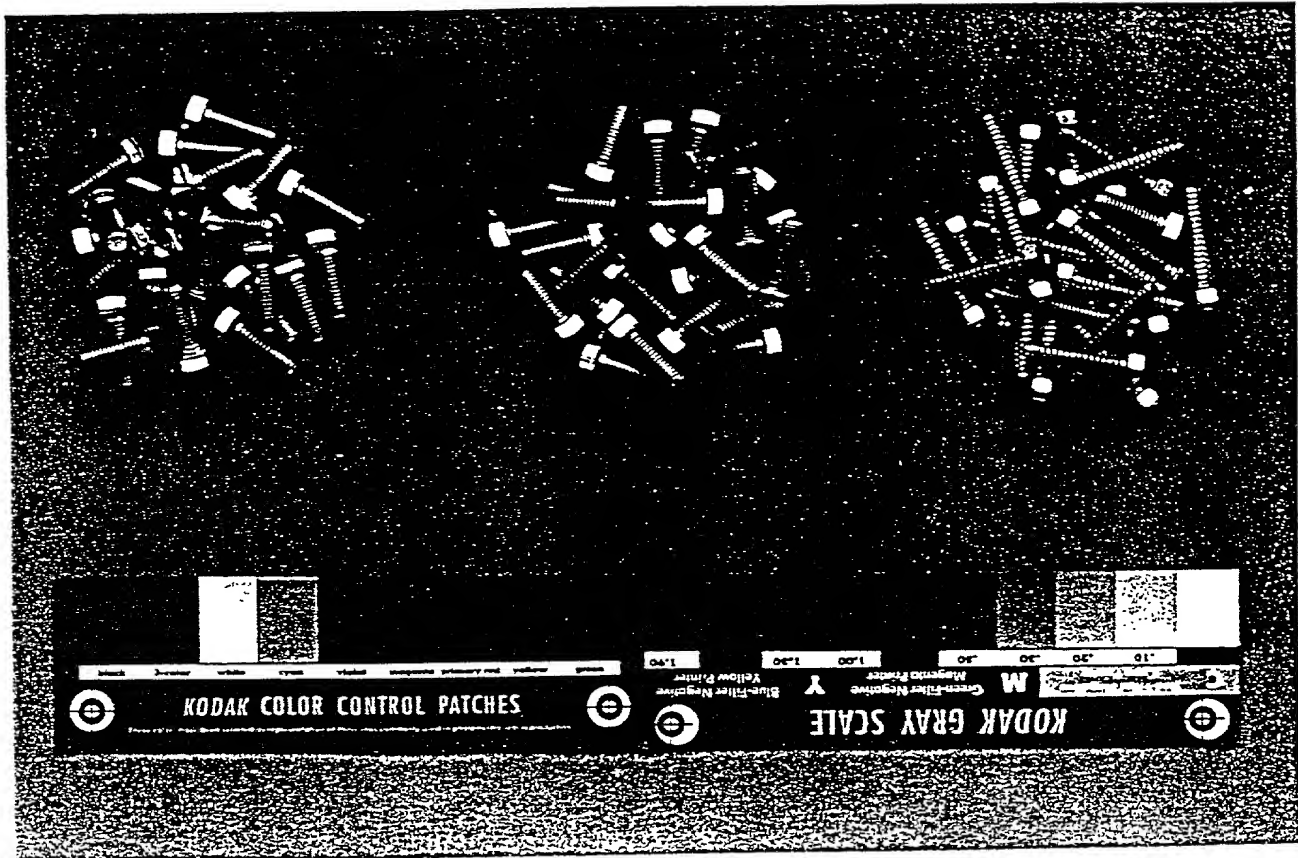


FIG. 2

2/38

Fig. 3

Bandwidth of iridescence according to the present invention
(on zinc-plated screws)



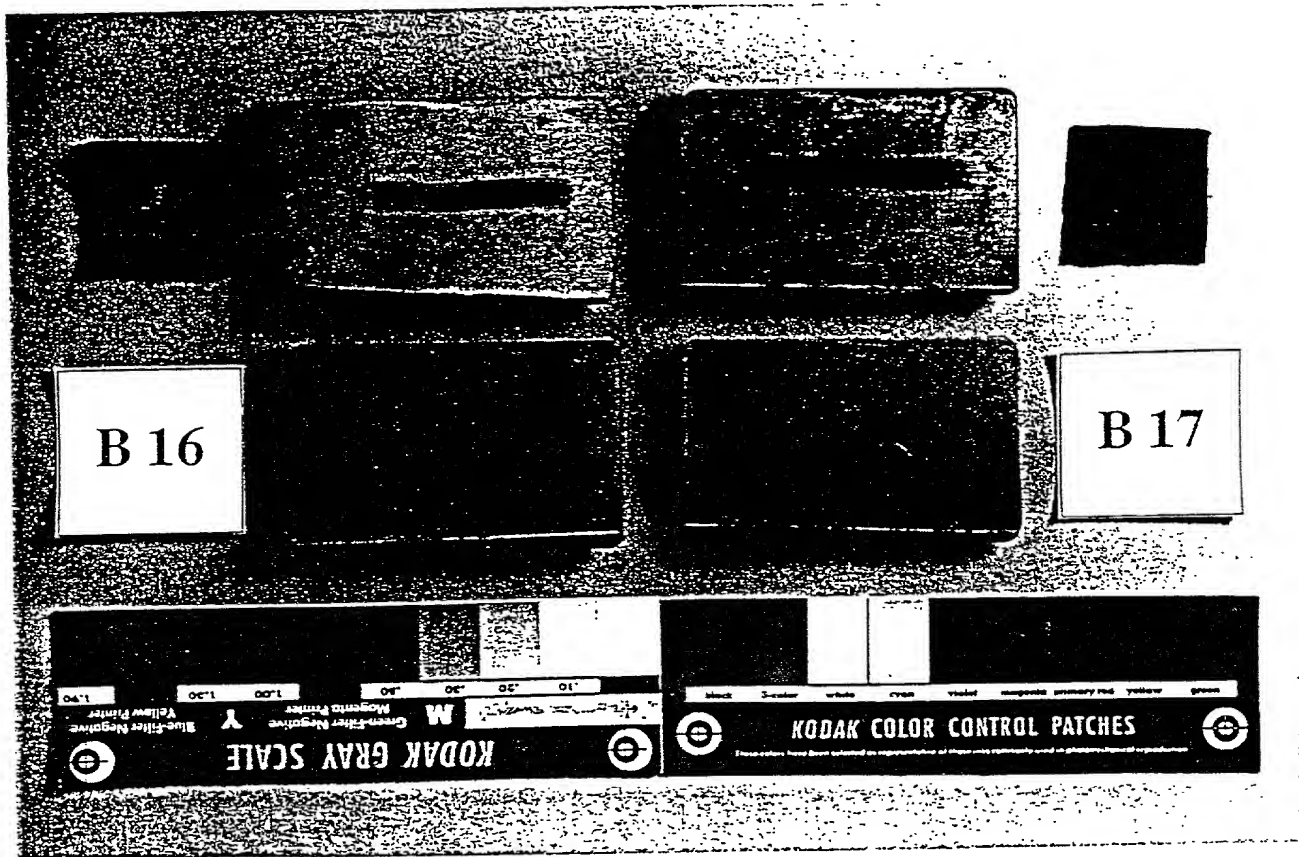
09904903-074394
F02F20-20040600

Fig. 4

Comparison test with EP 0 034 040

Example 16

Example 17



The upper picture half, one the outer left and right, shows a black cloth whereby the abrasions on the metal sheets shown in the top picture half were obtained. Layer portions - discernible as whitish stains - are on both pieces of cloth. The lower picture half shows the unmarred layers of the prior art.

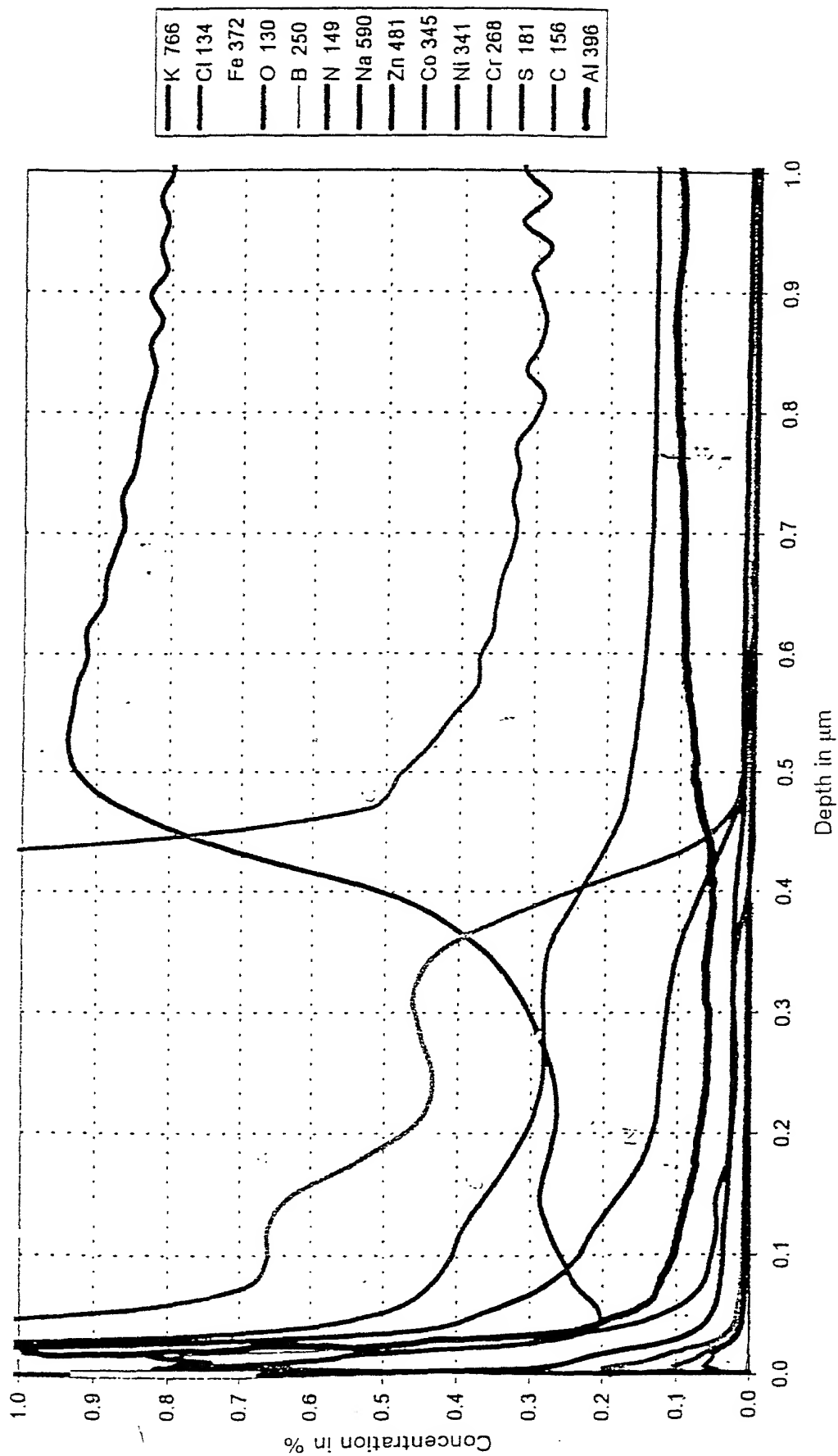
Substrate: Zinc-plated steel sheet.

TOE 2.0" E6640660

Diagram 1

FIG. 5

Pattern 1, Measurement Position A



TO Diagram 2E6640660

Pattern 1, Measurement Position A

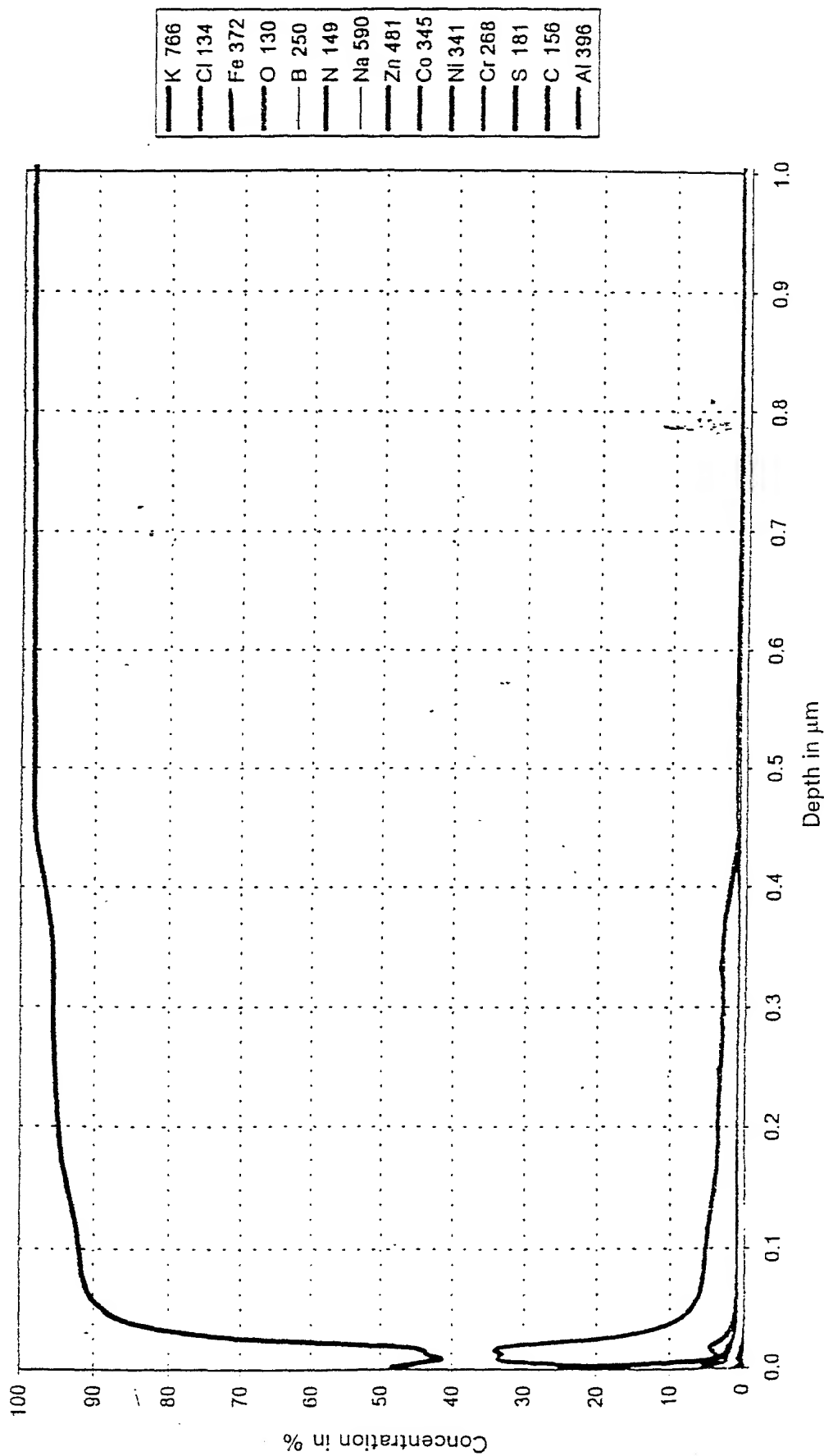
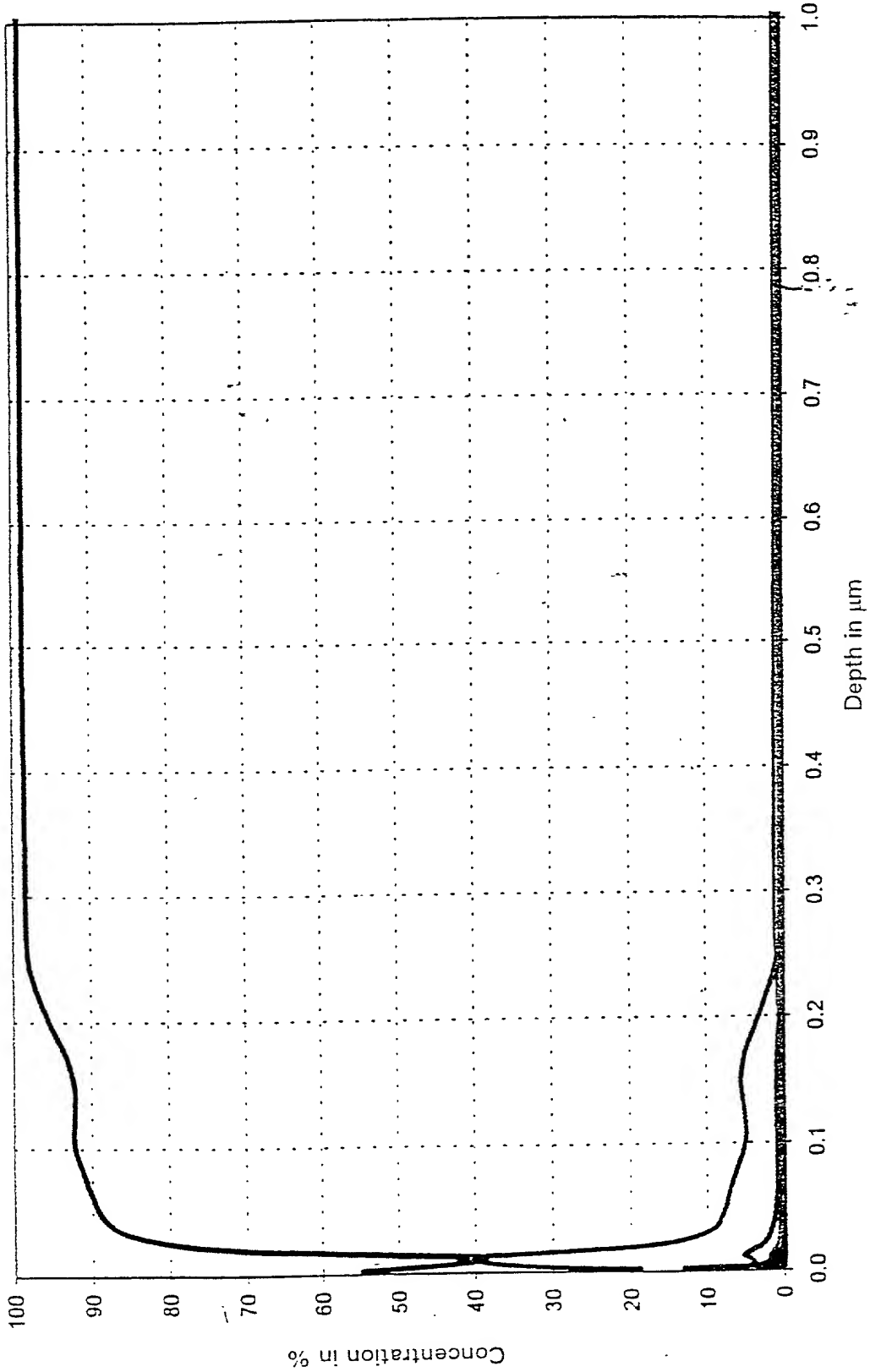


FIG. 6

Diagram 1

Sample 1, Measurement Position B



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

Diagram 2

Sample 1, Measurement Position B

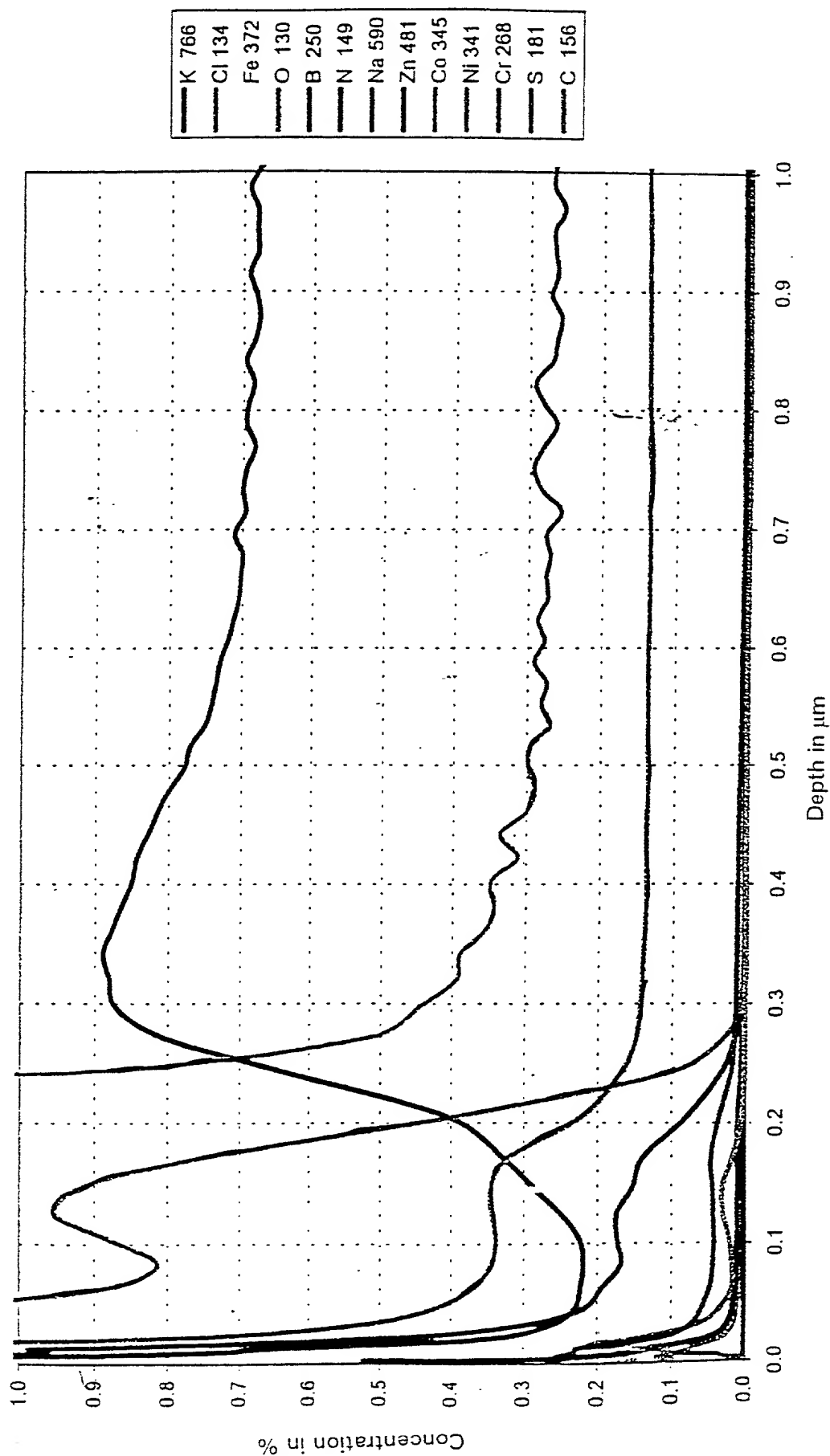
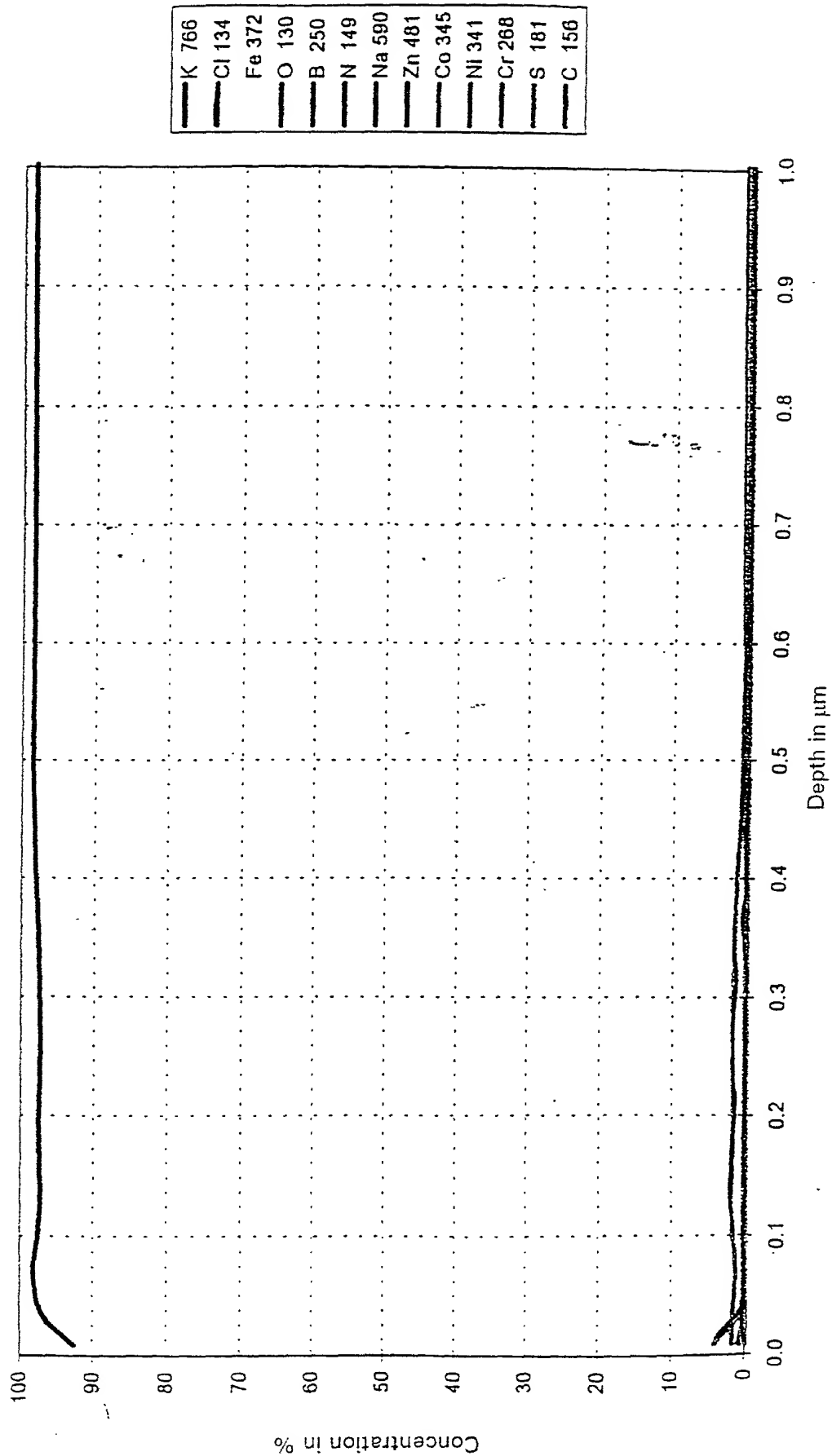


FIG. 8

T0E720" E664D660

Sample 2, Measurement Position A

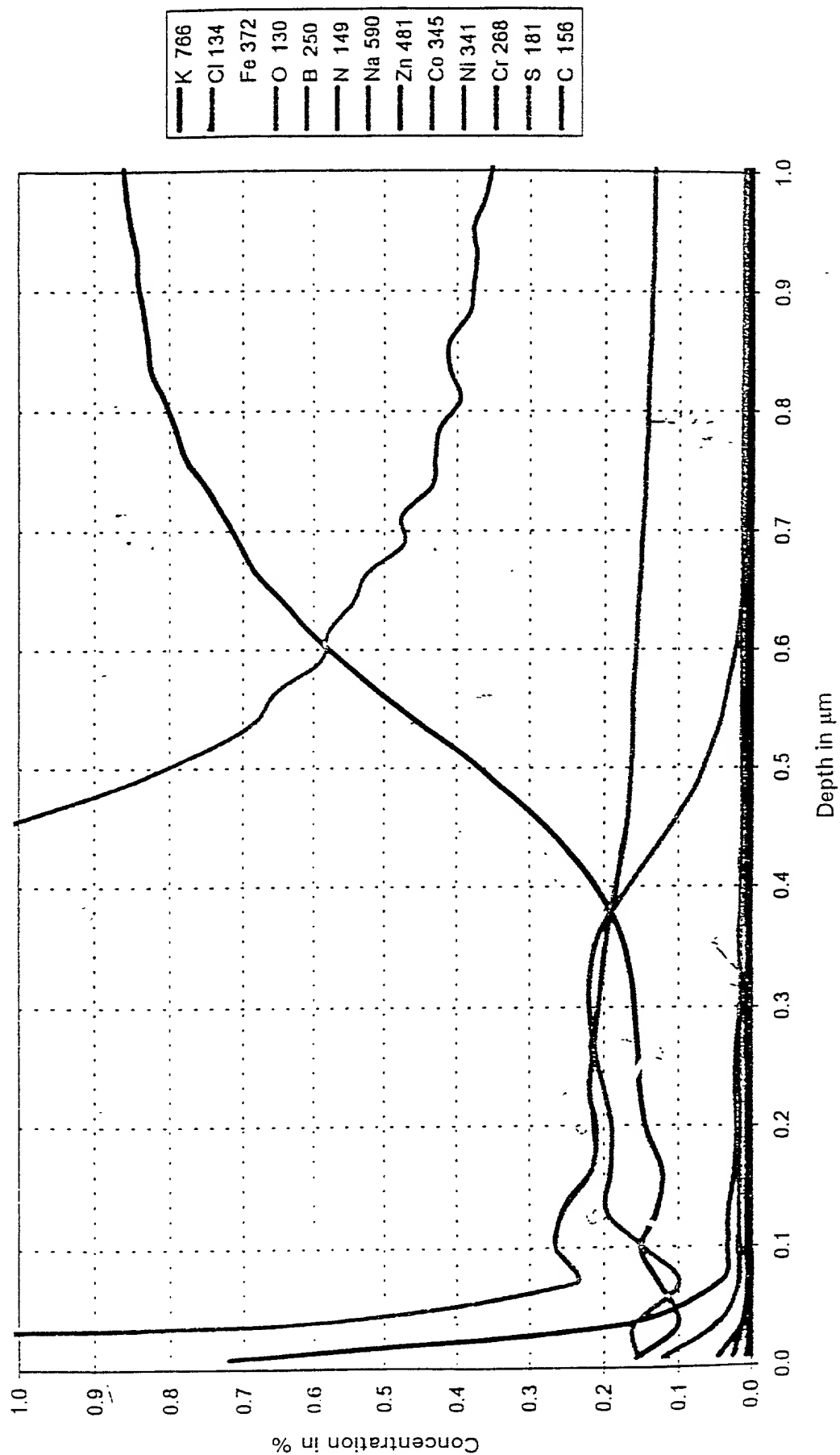


TOE T 20" E 6640560

Diagram 2

Sample 2, Measurement Position A

FIG. 10



TUEF20" E6640560

FIG. 11

Diagram 1

Sample 2, Measurement Position B

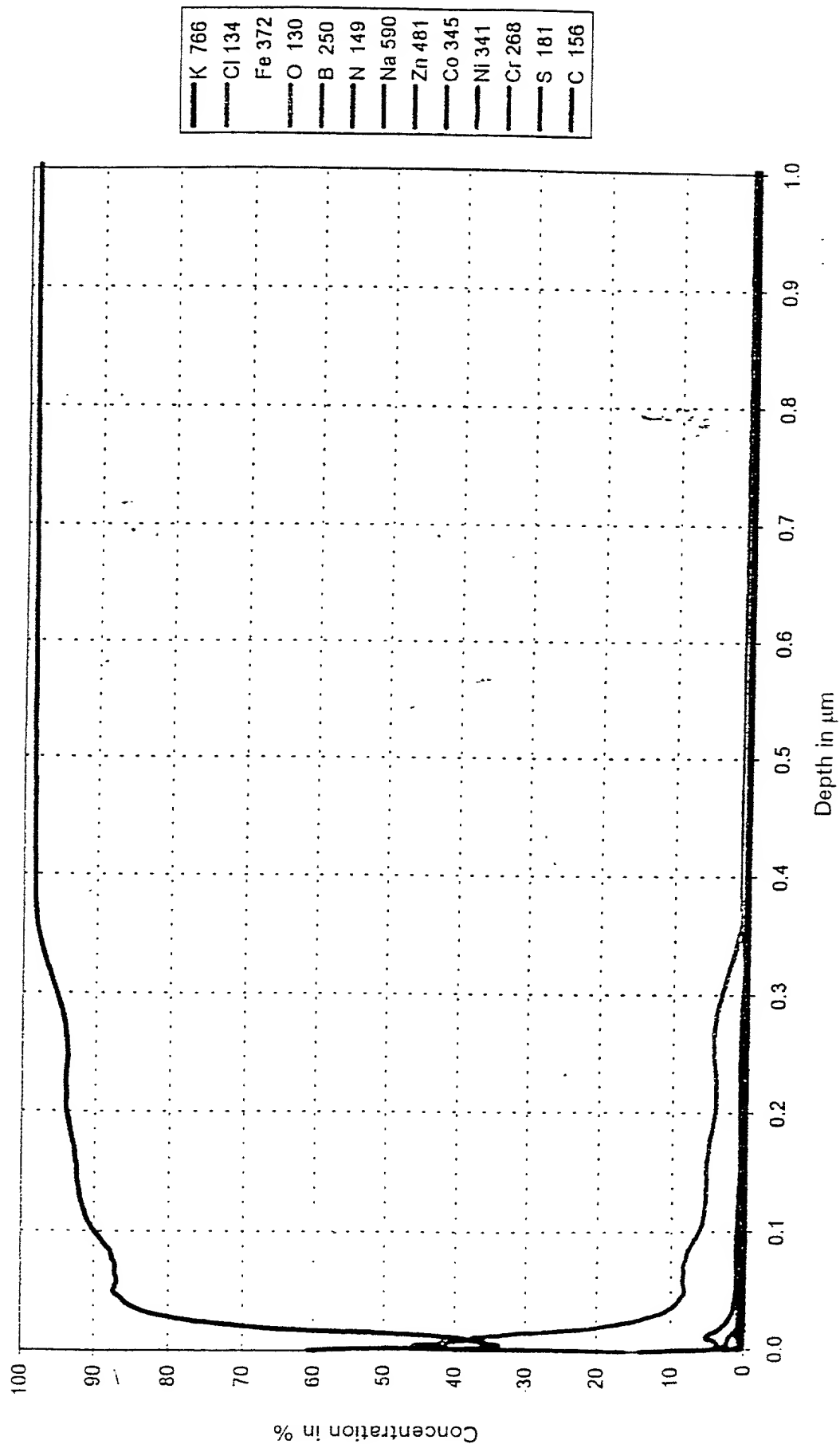
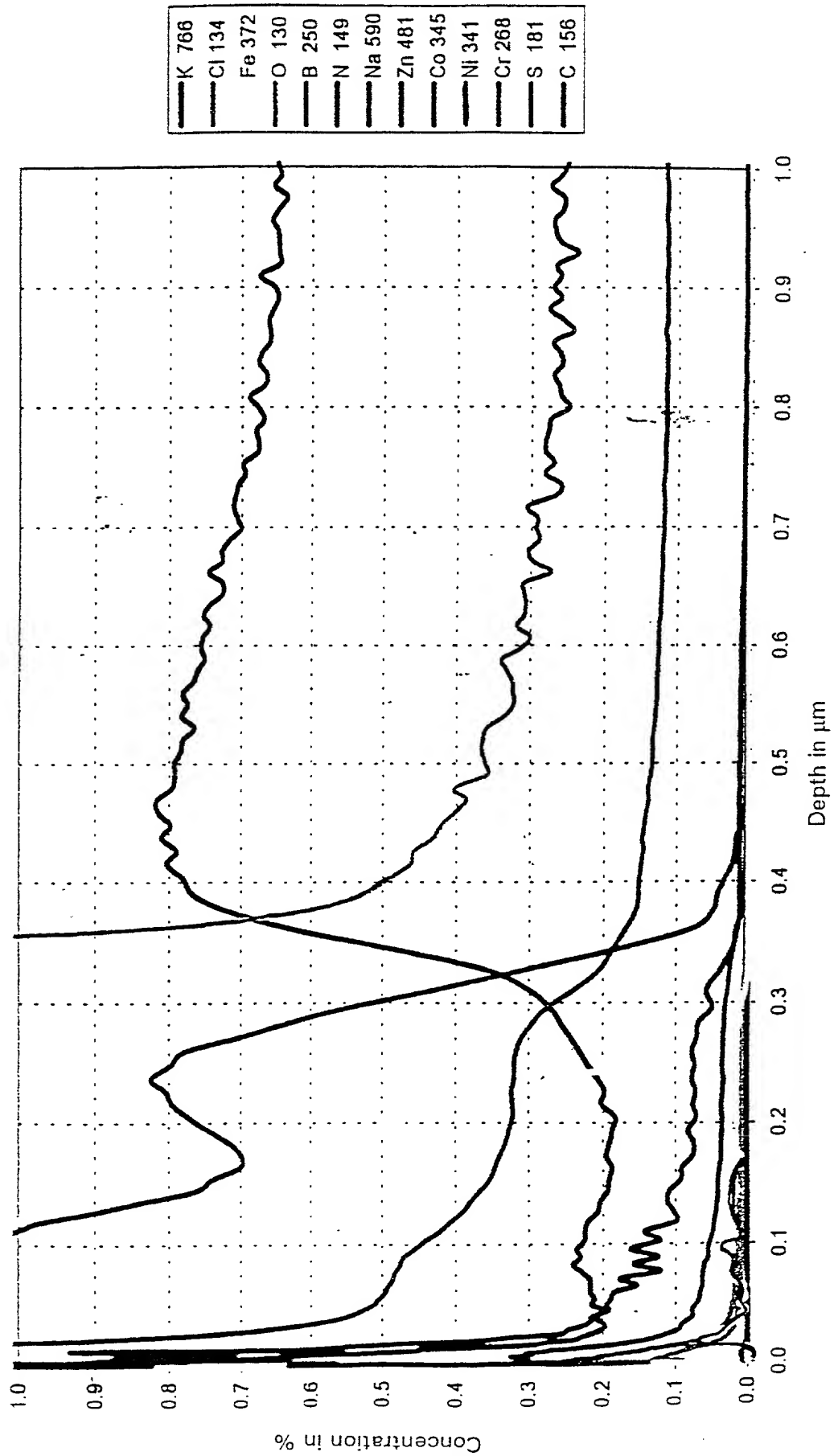


Diagram 2

Sample 2, Measurement Position B



TOPT20 E6640660
Diagram 1

Sample 3, Measurement Position A

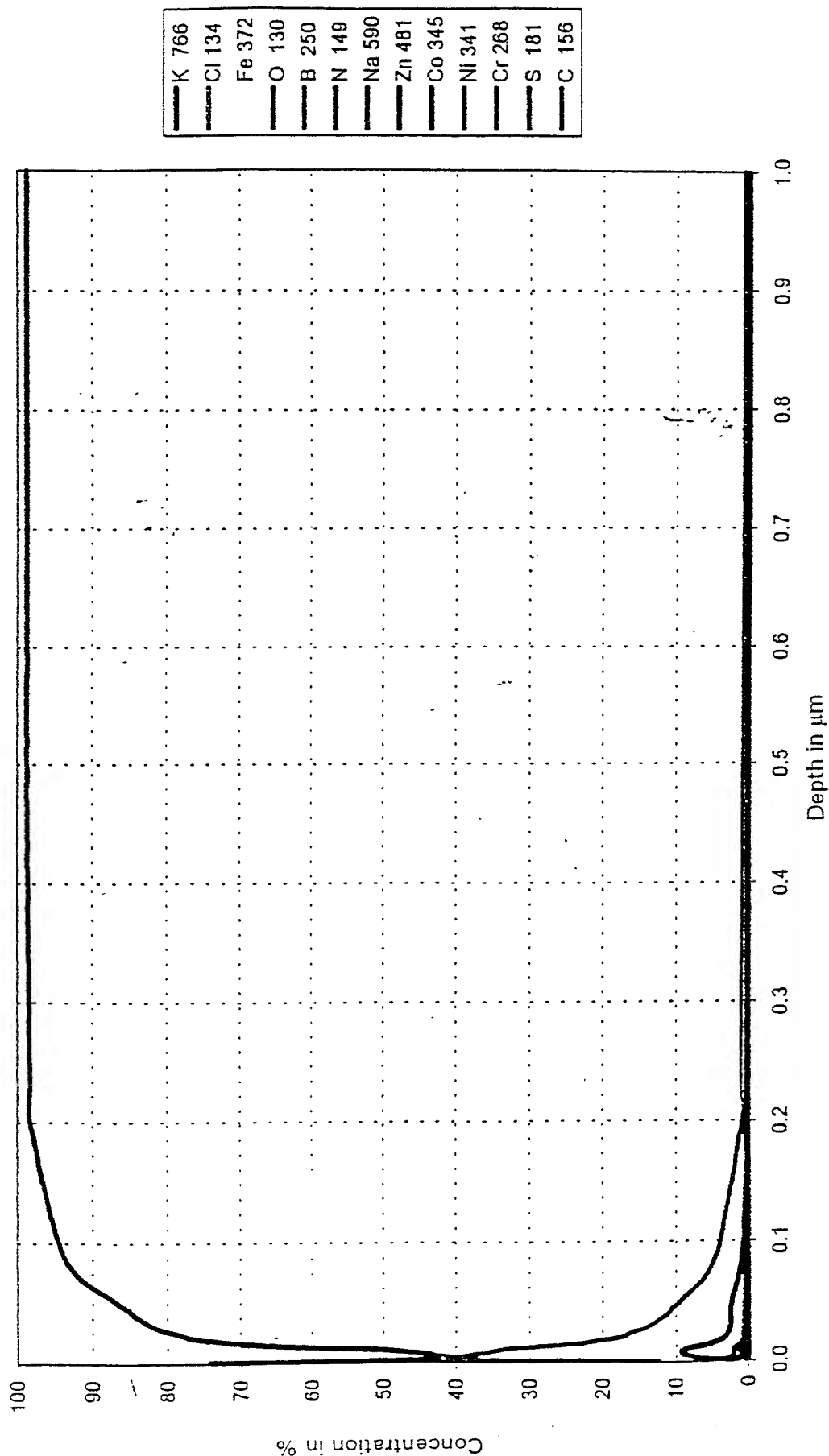
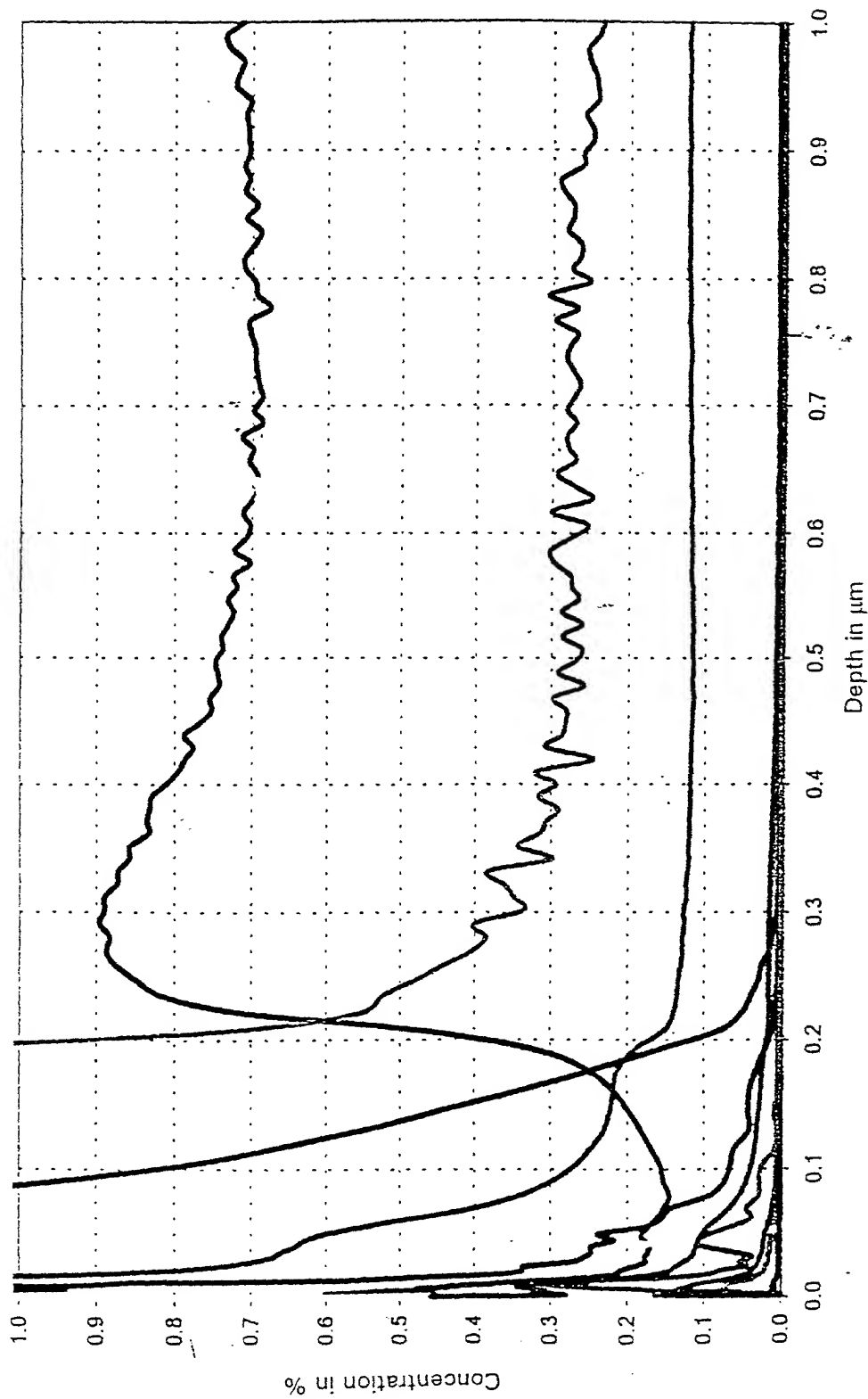
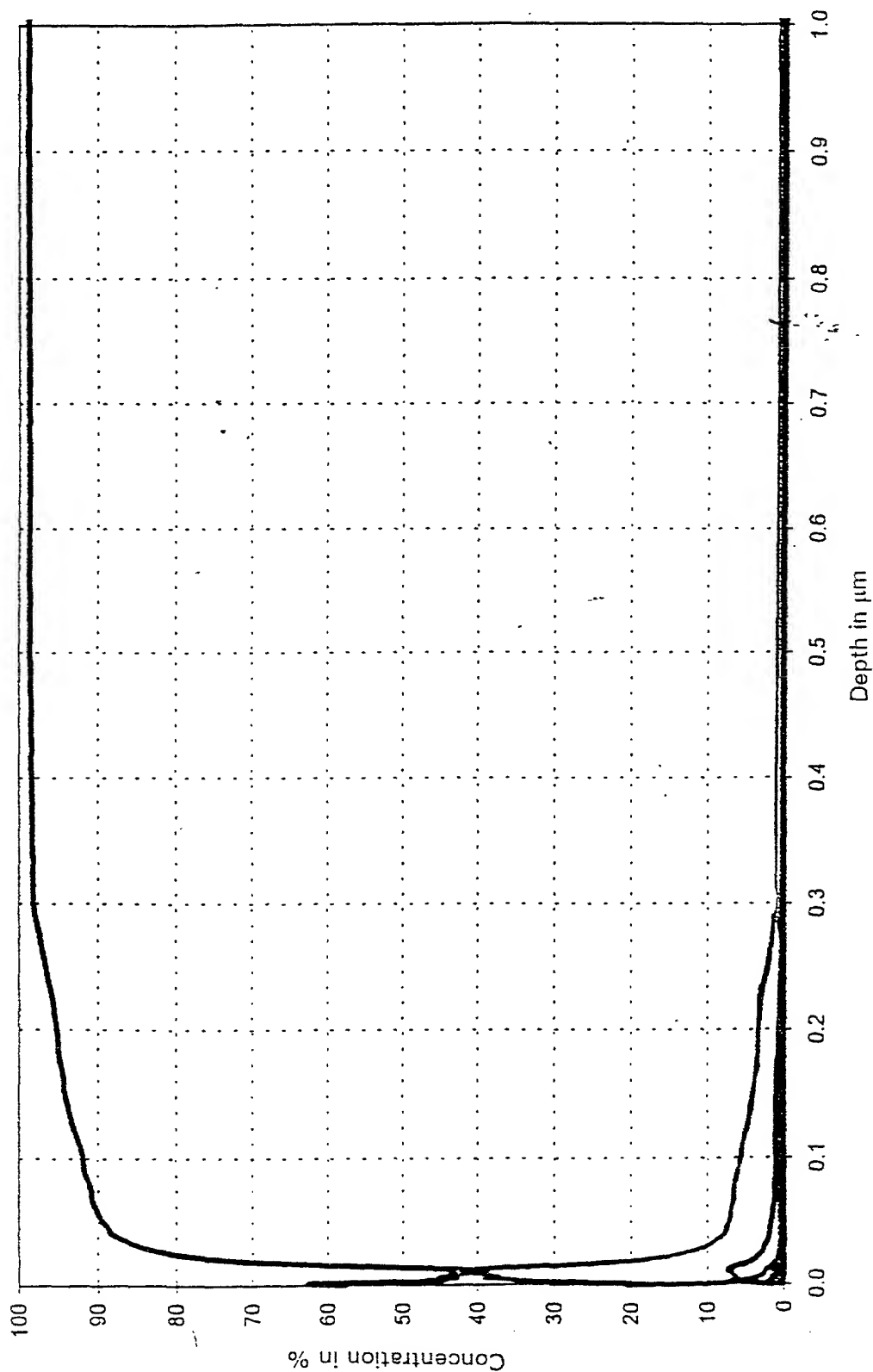


Diagram 2
TOE 20" E6640660
Sample 3, Measurement Position A



Sample 4, Measurement Position A



FOET 20" E6640660
Diagram 2

Sample 4, Measurement Position A

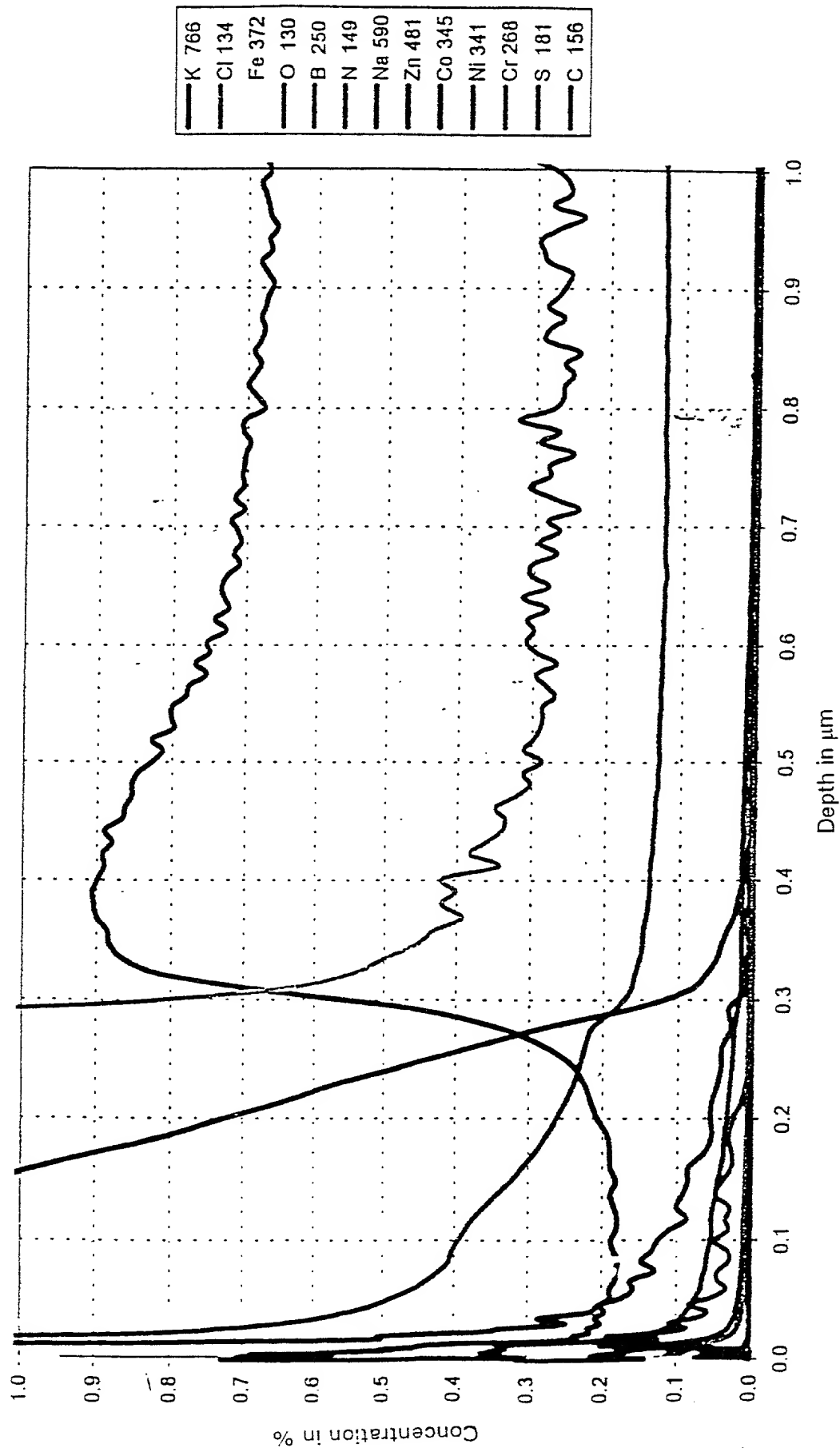
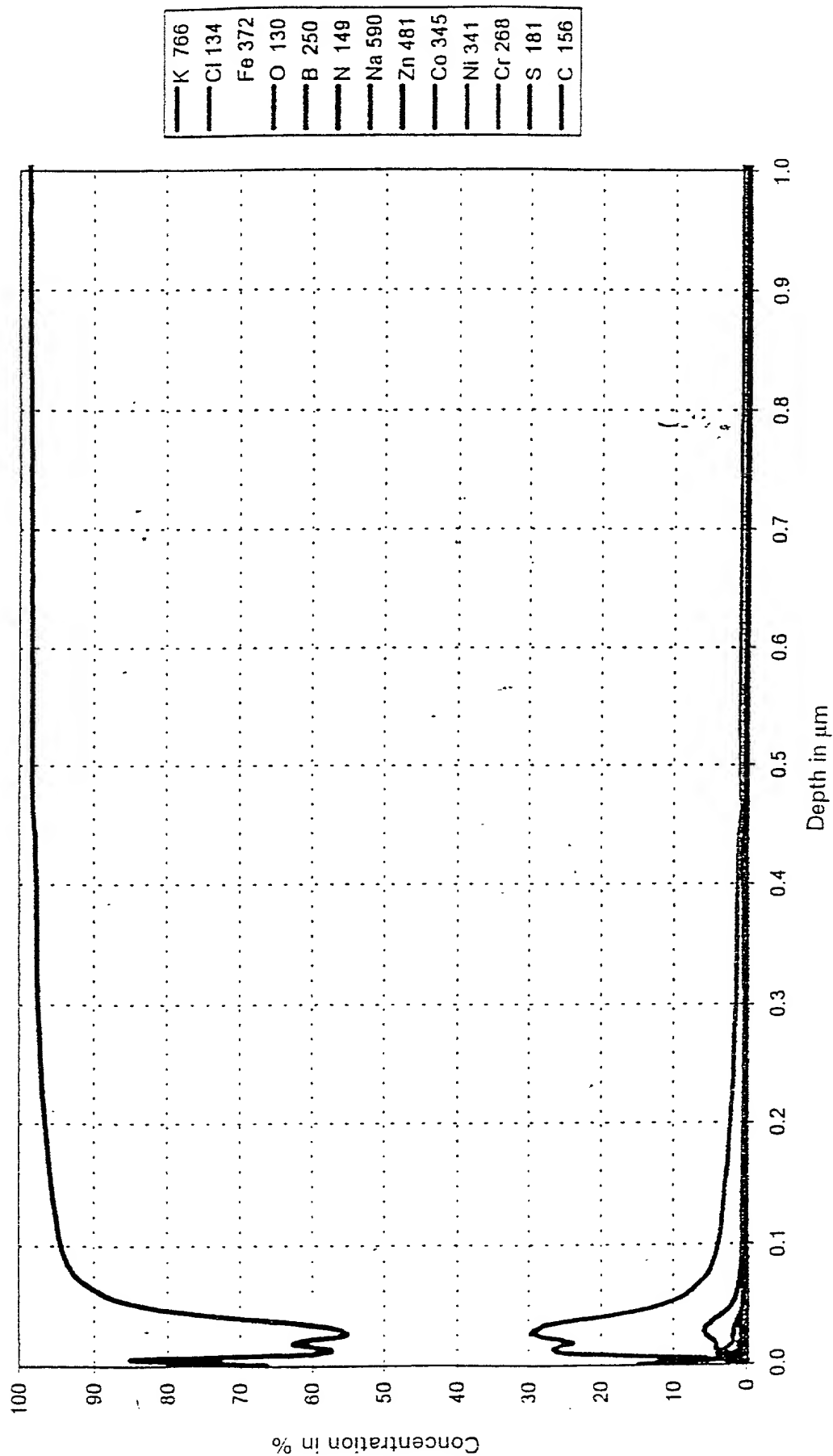


FIG. 16

TOE20" E6640560
Diagram 1

Sample 5, Measurement Position A



FOET 20" E5540660

Diagram 2

Sample 5, Measurement Position A

FIG. 18

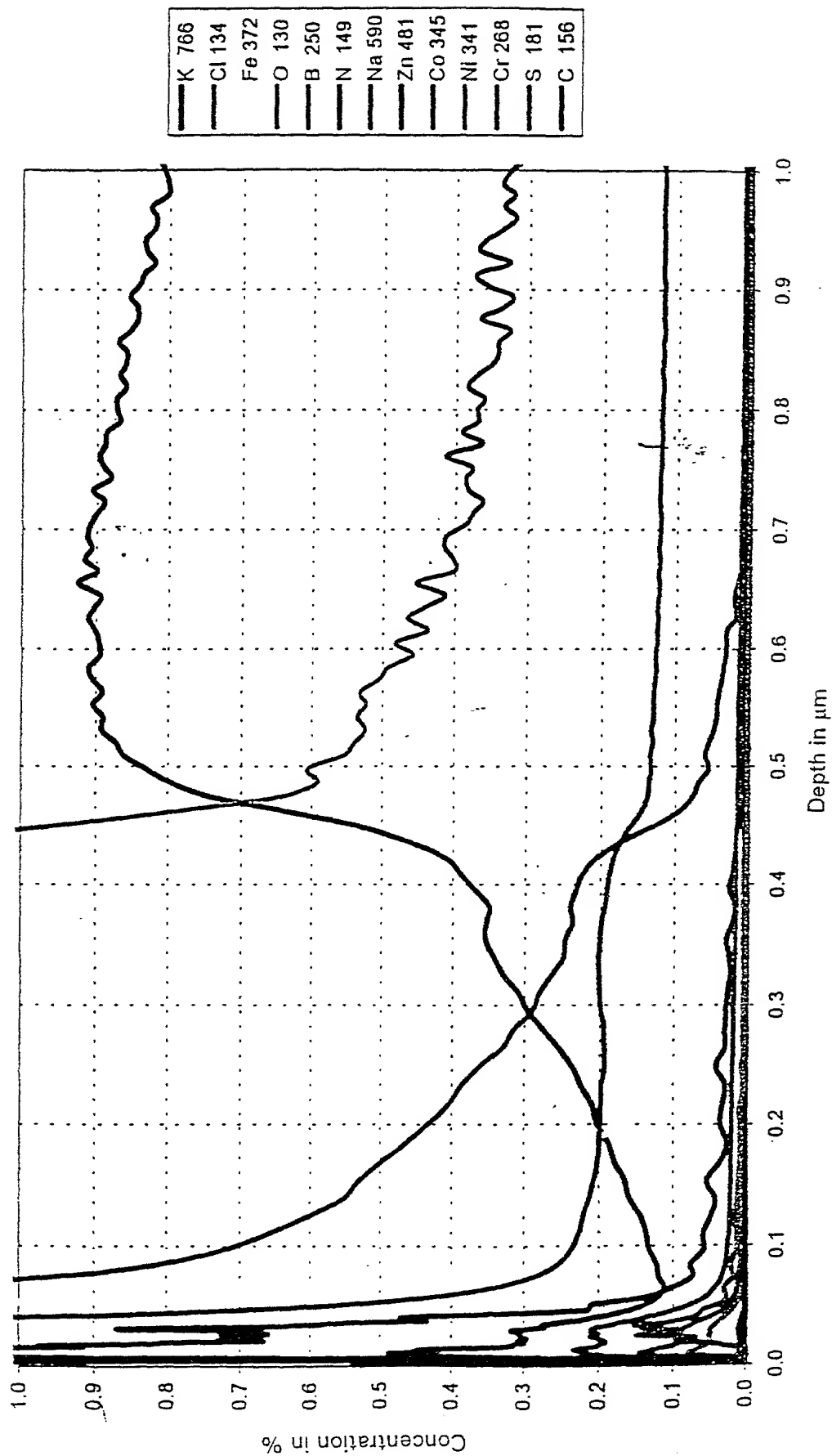
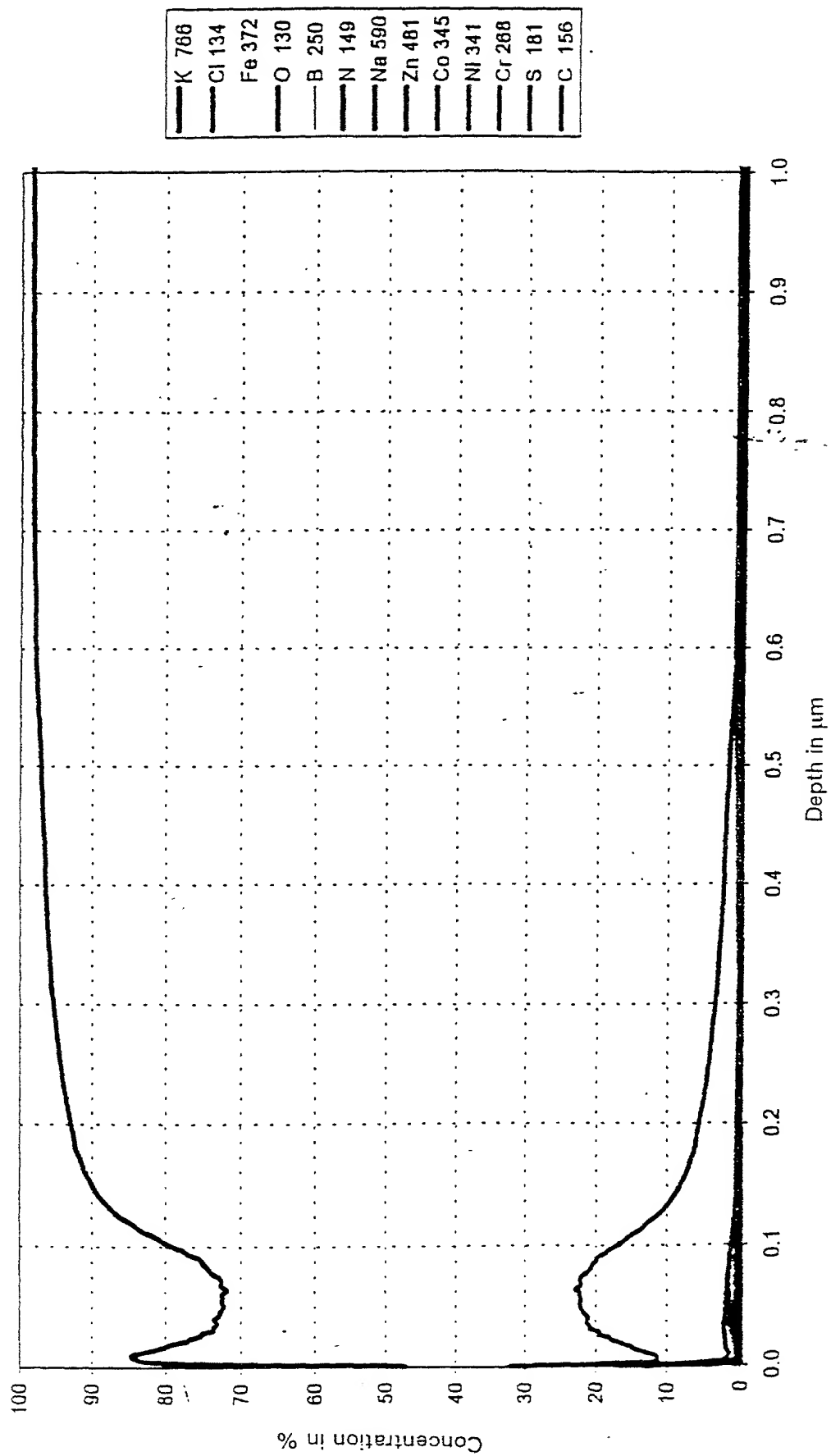
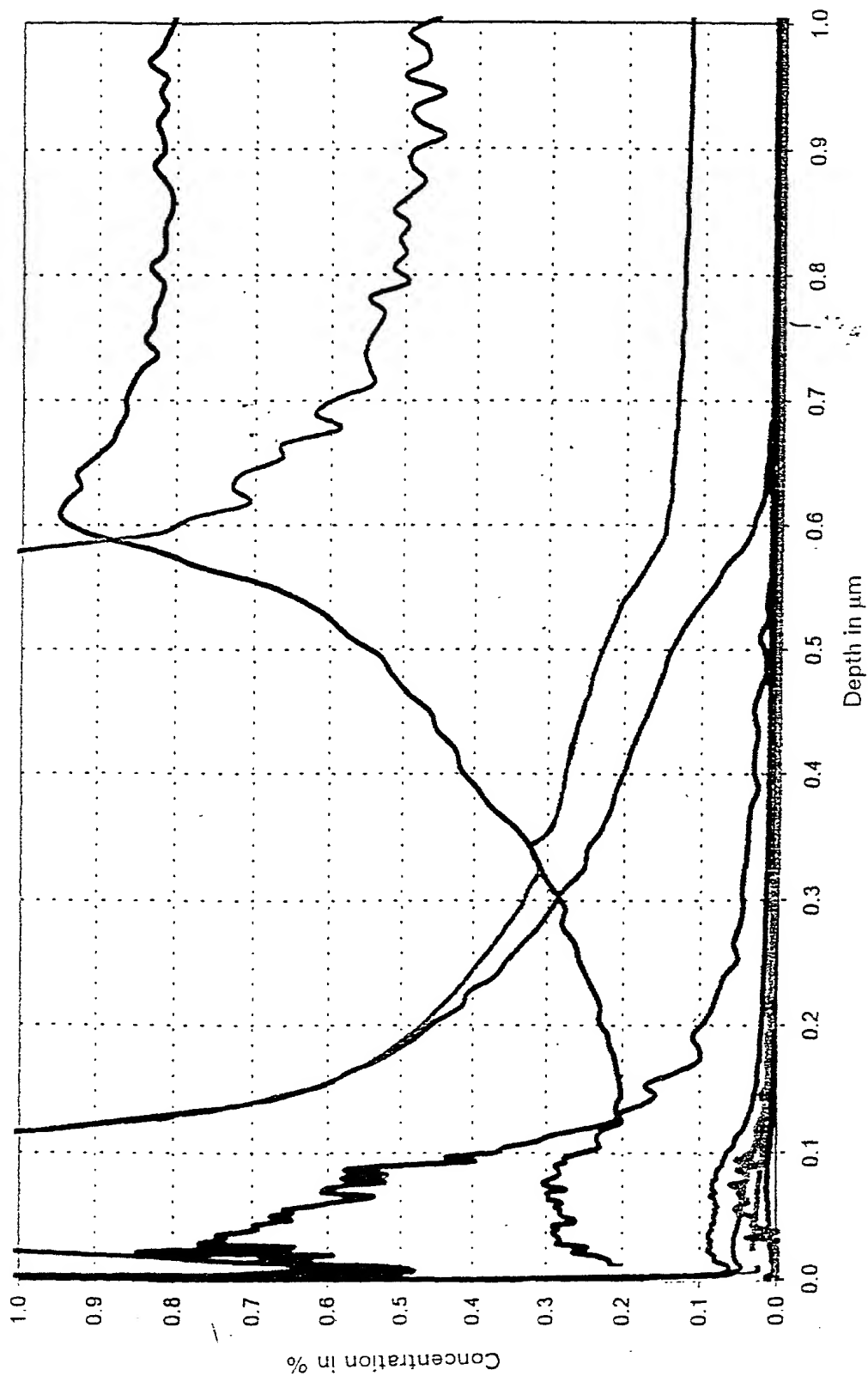


Diagram 1
T05F20" C6640660

Sample 6, Measurement Position A

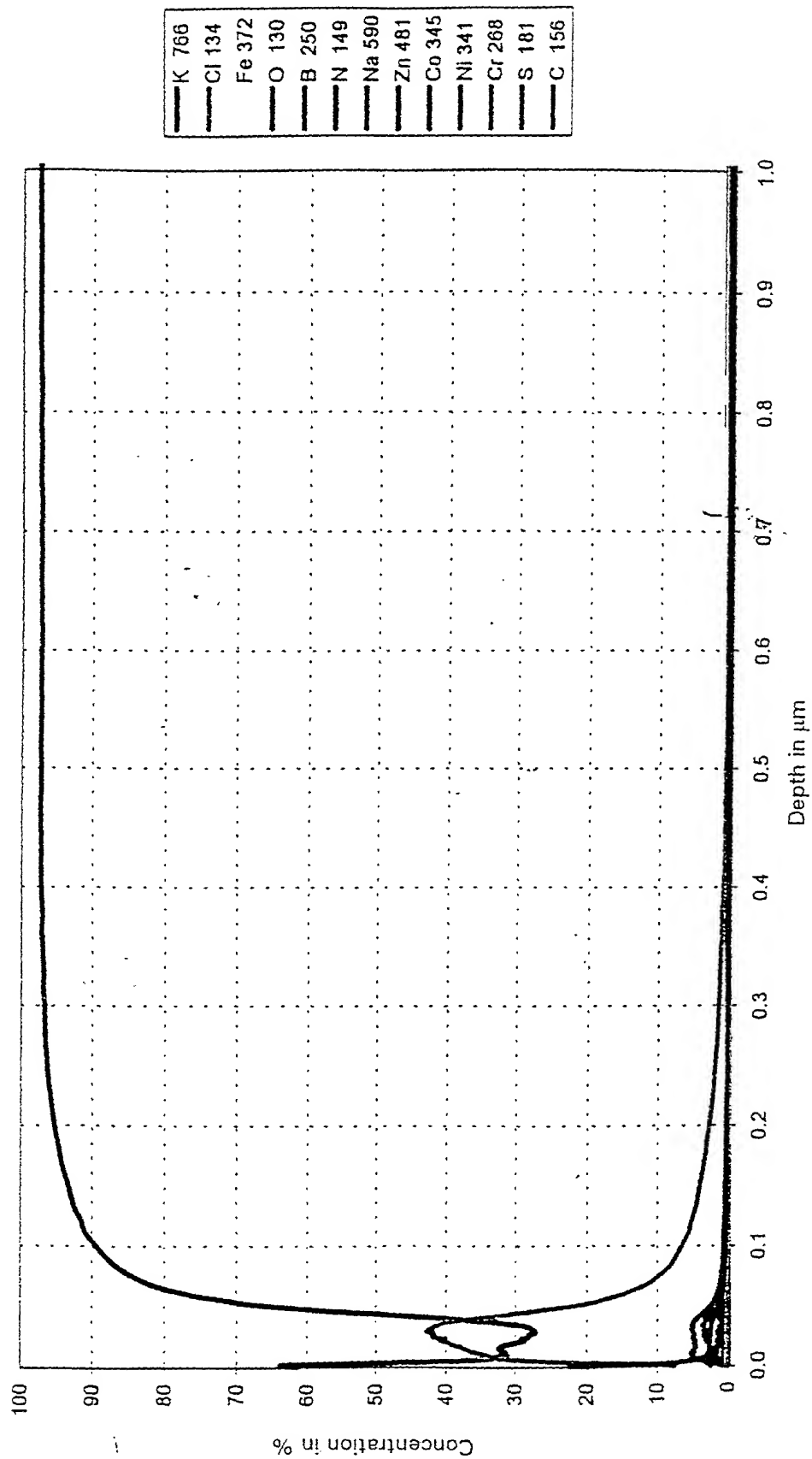


Sample 6, Measurement Position A



TOE Diagram 1540660

Sample 6, Measurement Position B



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

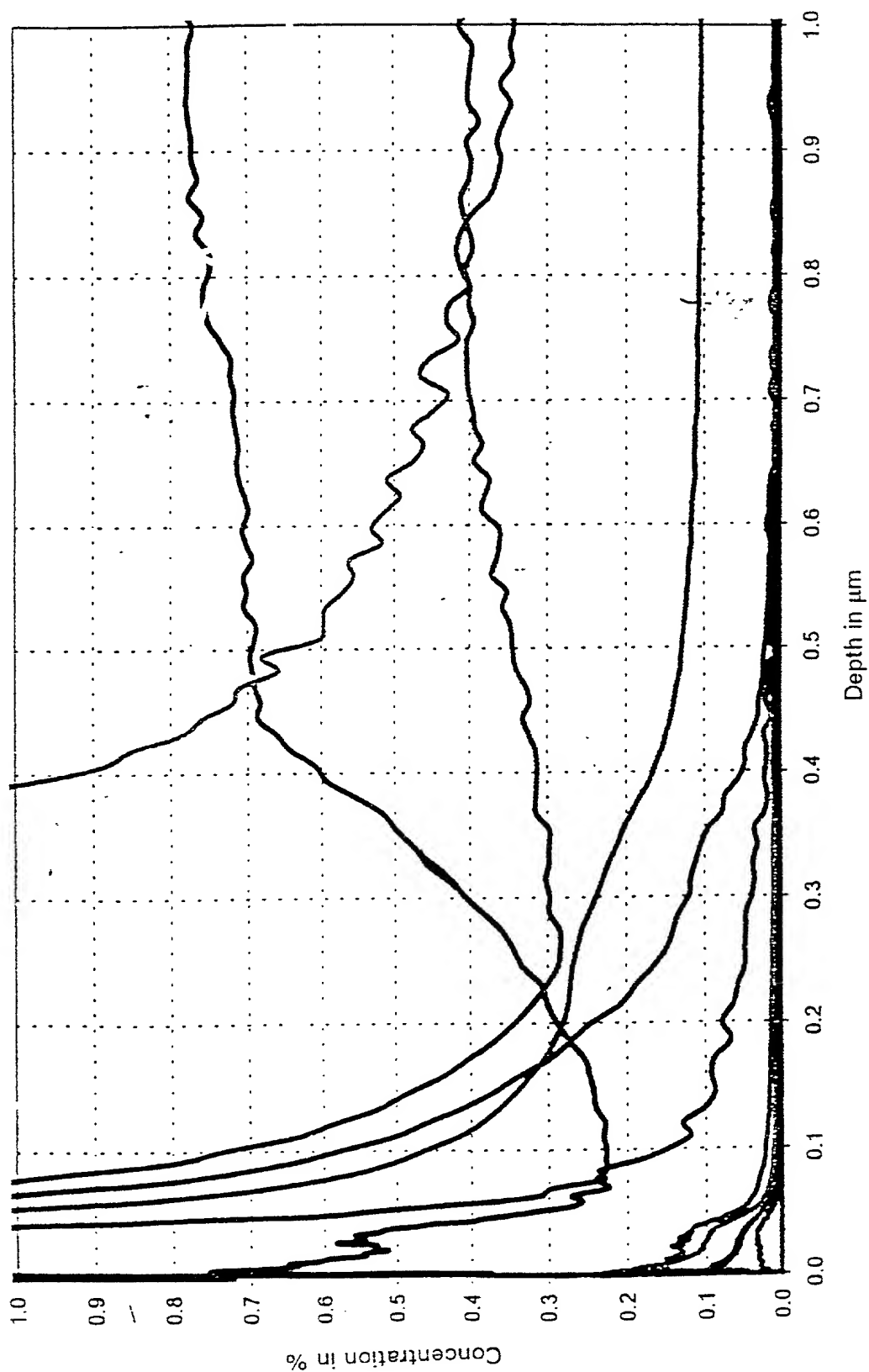


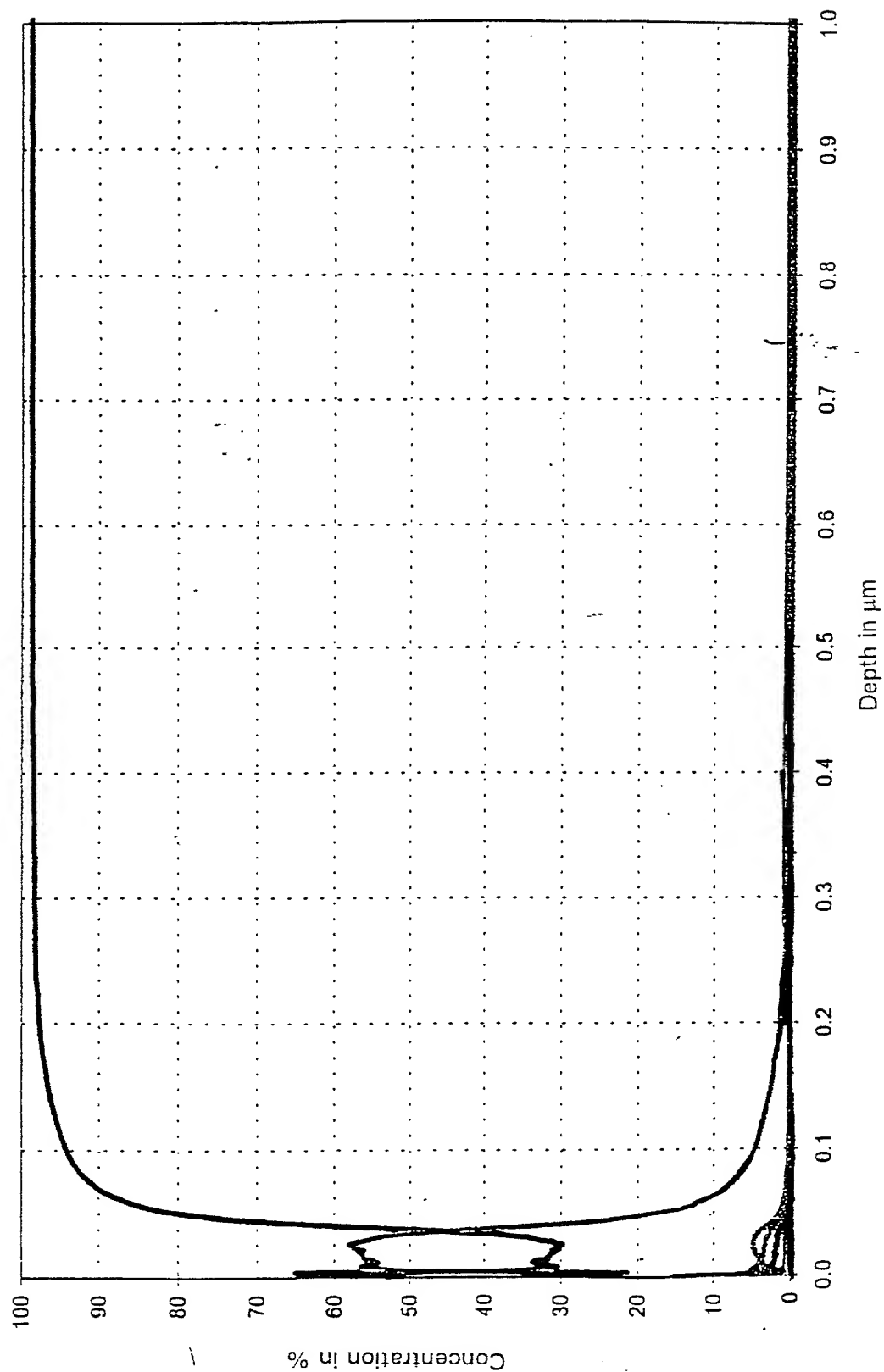
FIG. 22

Sample 6, Measurement Position B

Diagram 2

T06T20" E66H0660

Sample 6, Measurement Position C



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

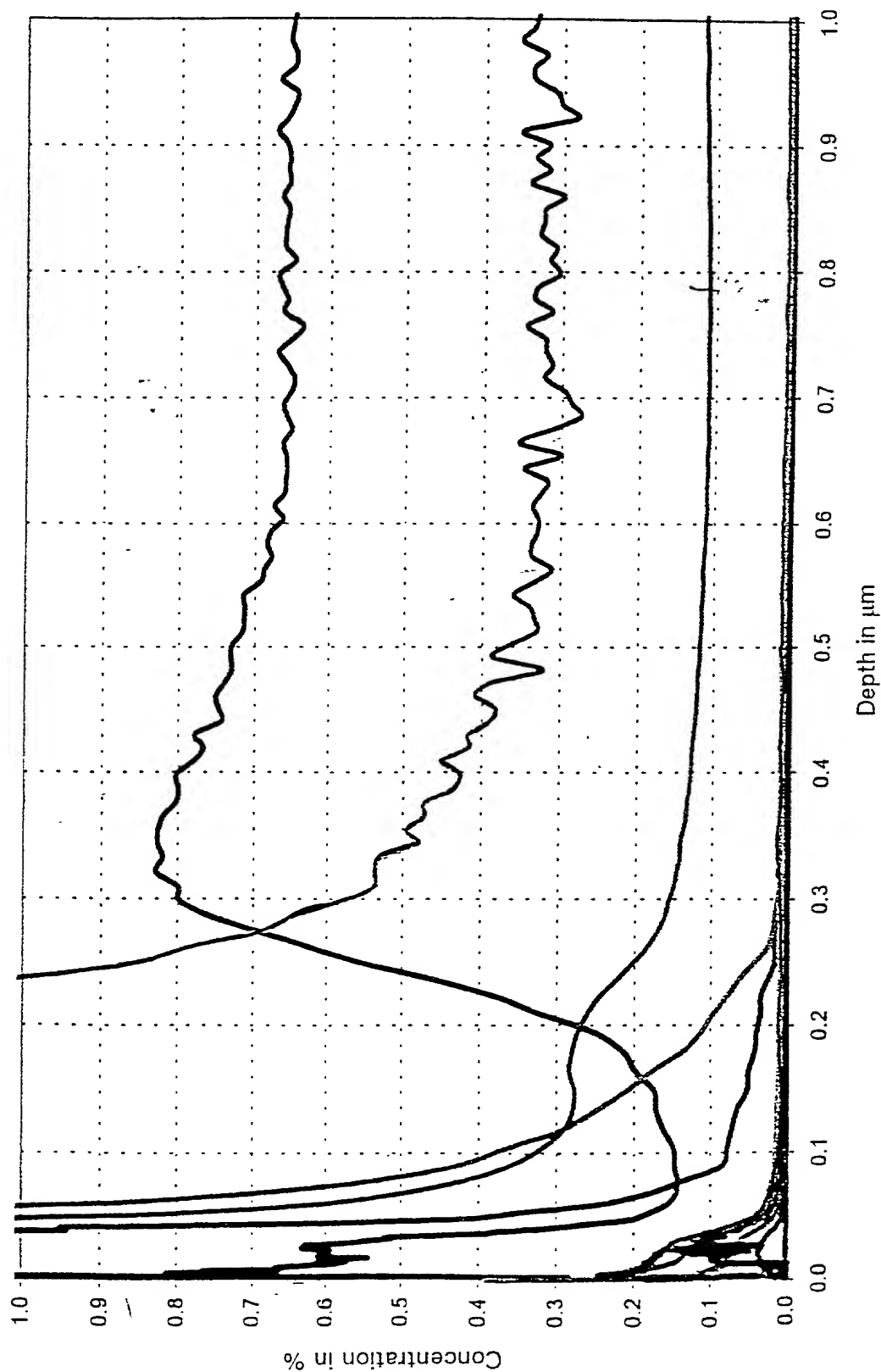


FIG. 24

Diagram 2

Sample 6, Measurement Position C

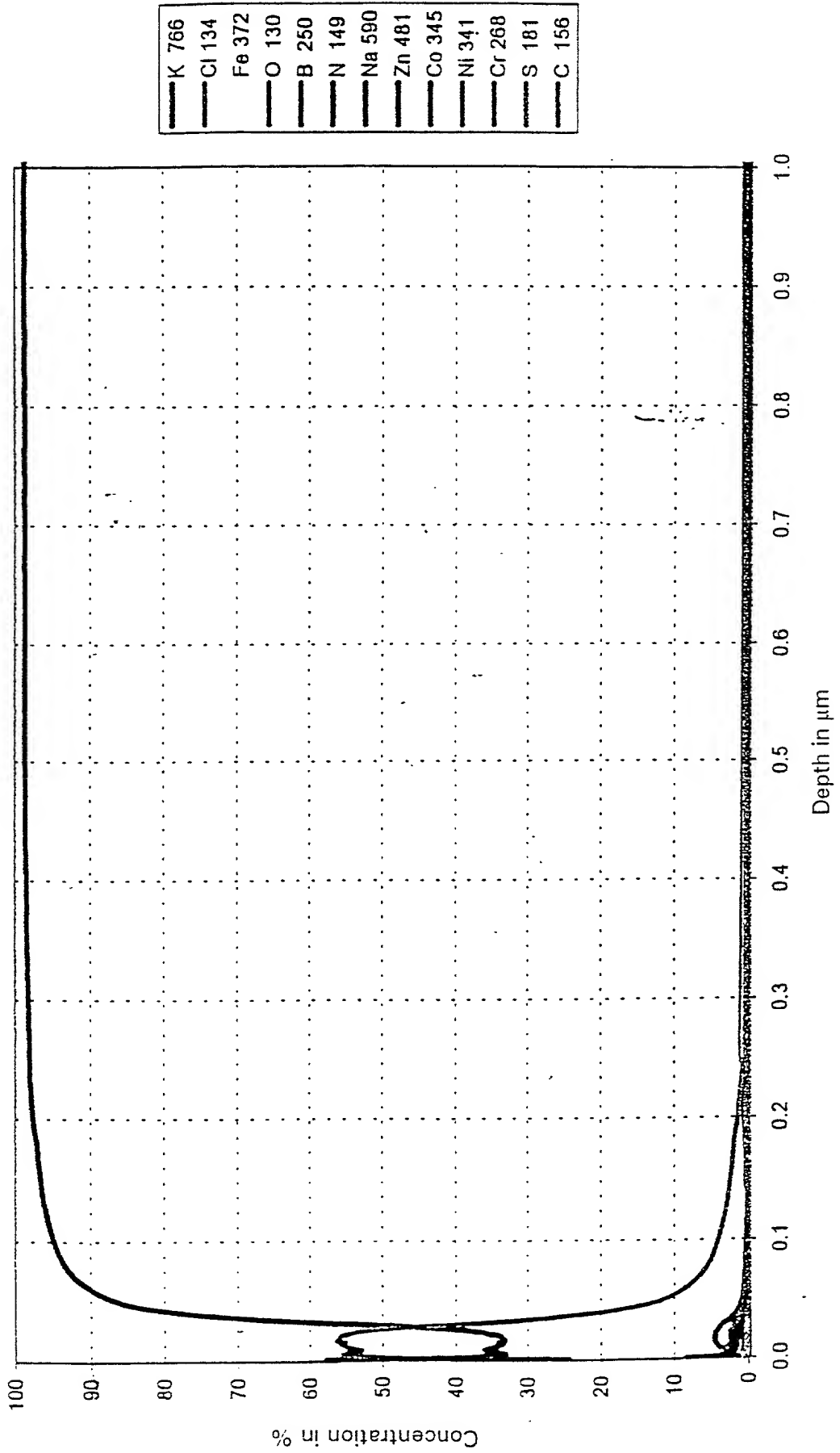
FOET 20" E6640660

FOET 20" E6640660

Diagram 1

Sample 6, Measurement Position D

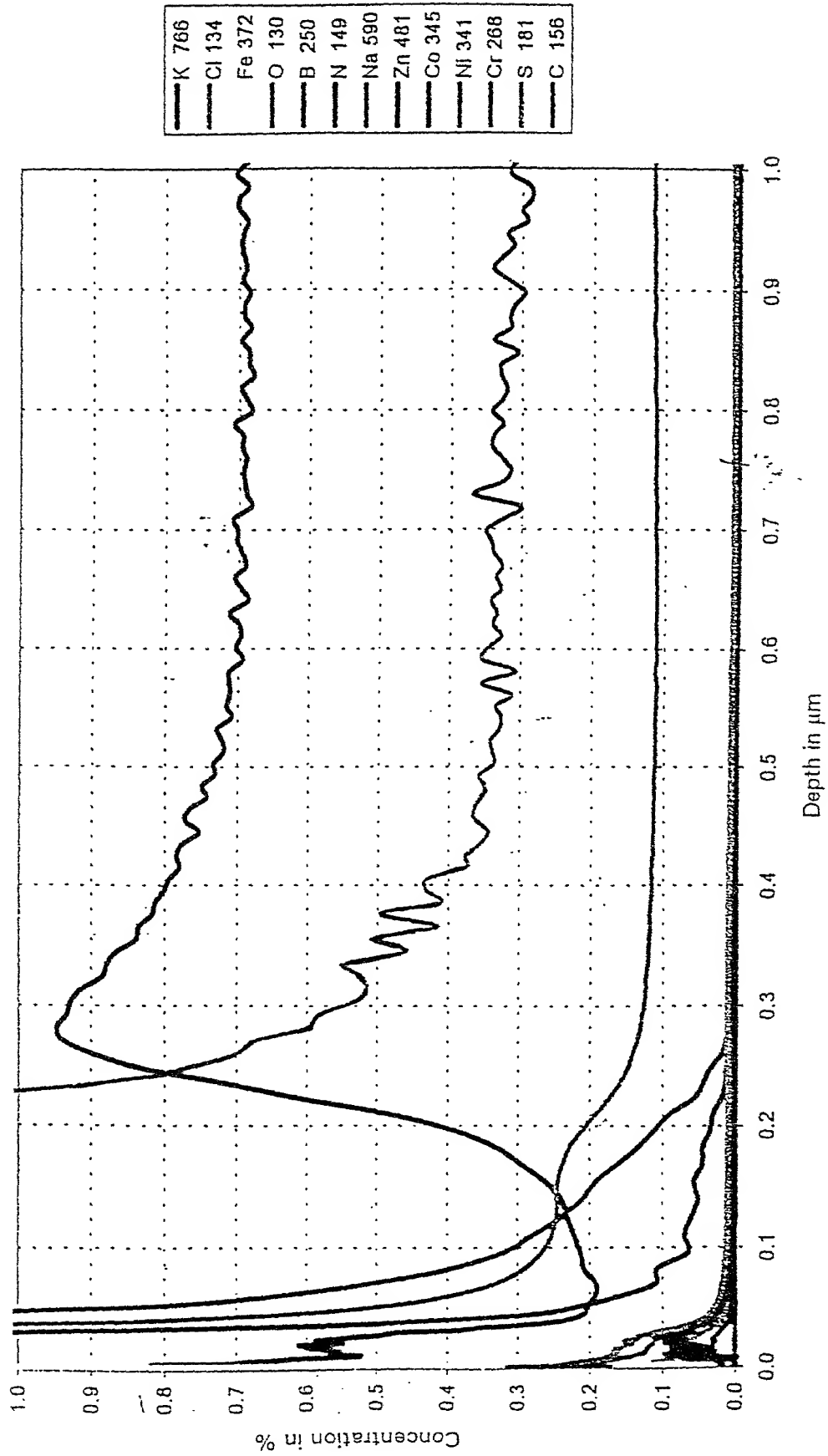
FIG. 25



TOCTCO" E6640660

FIG. 26

Sample 6, Measurement Position D



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

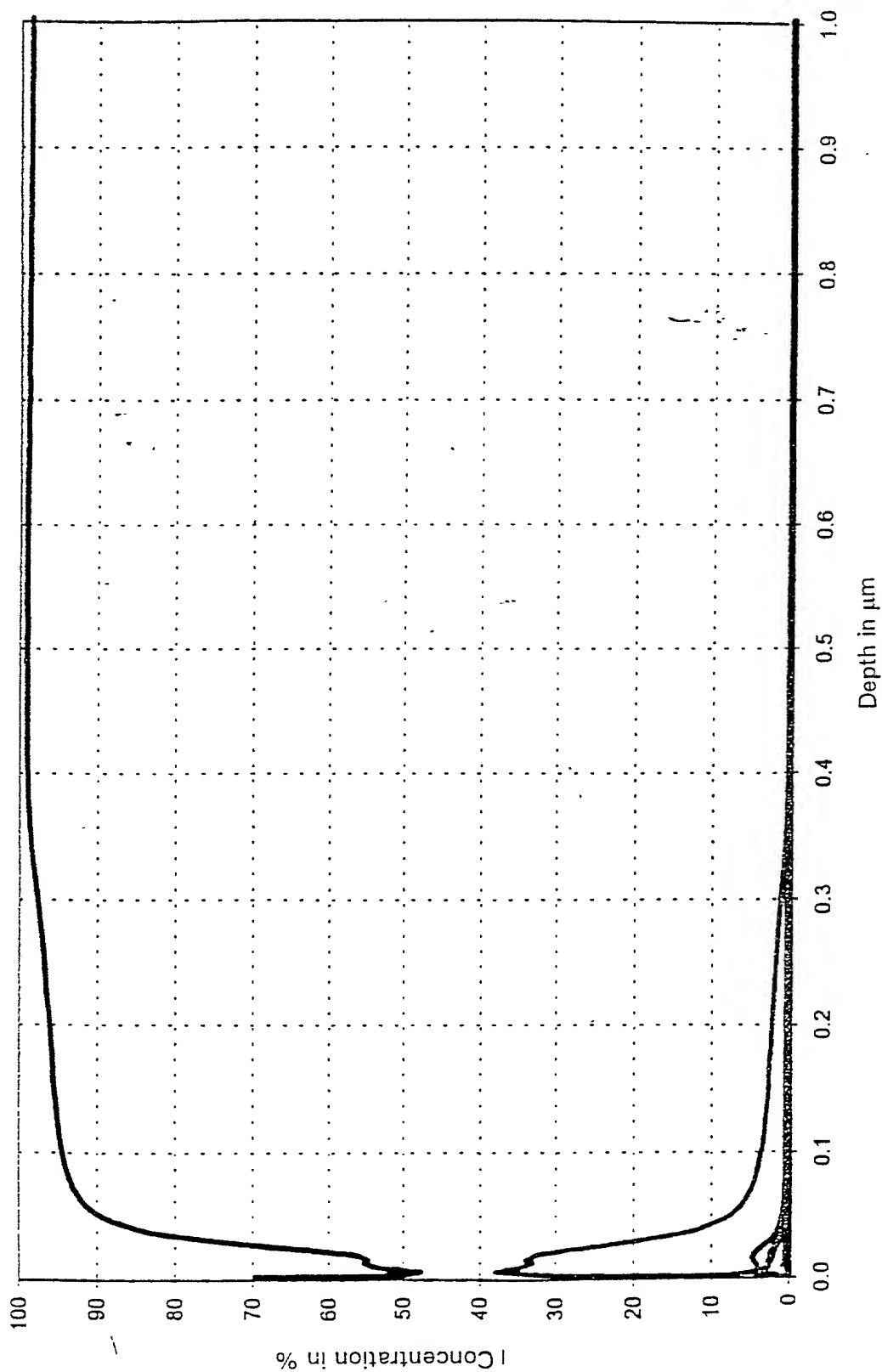


FIG. 27

Diagram 1

Sample 7, Measurement Position A

T06F20" E6640660

—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

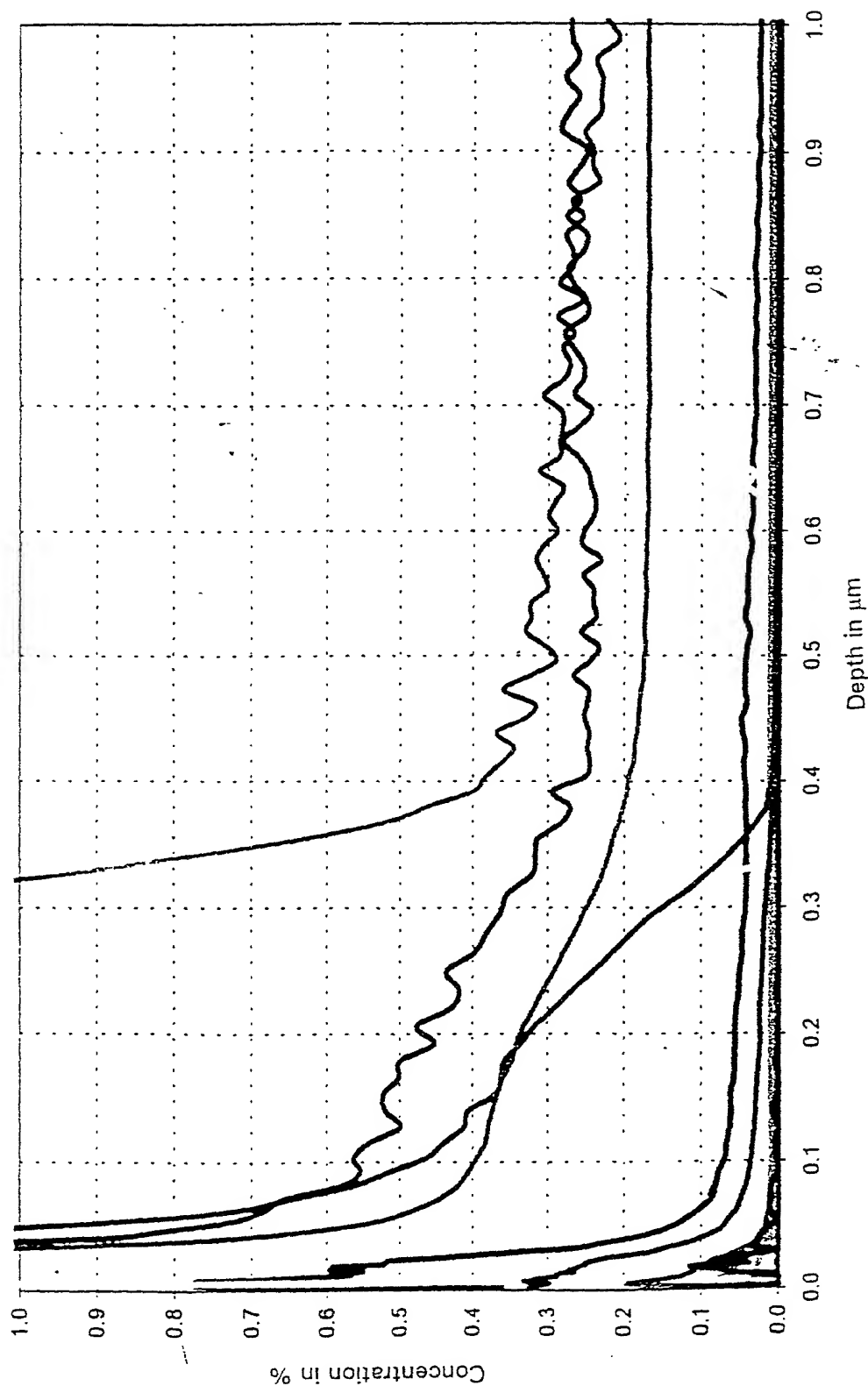


FIG. 28

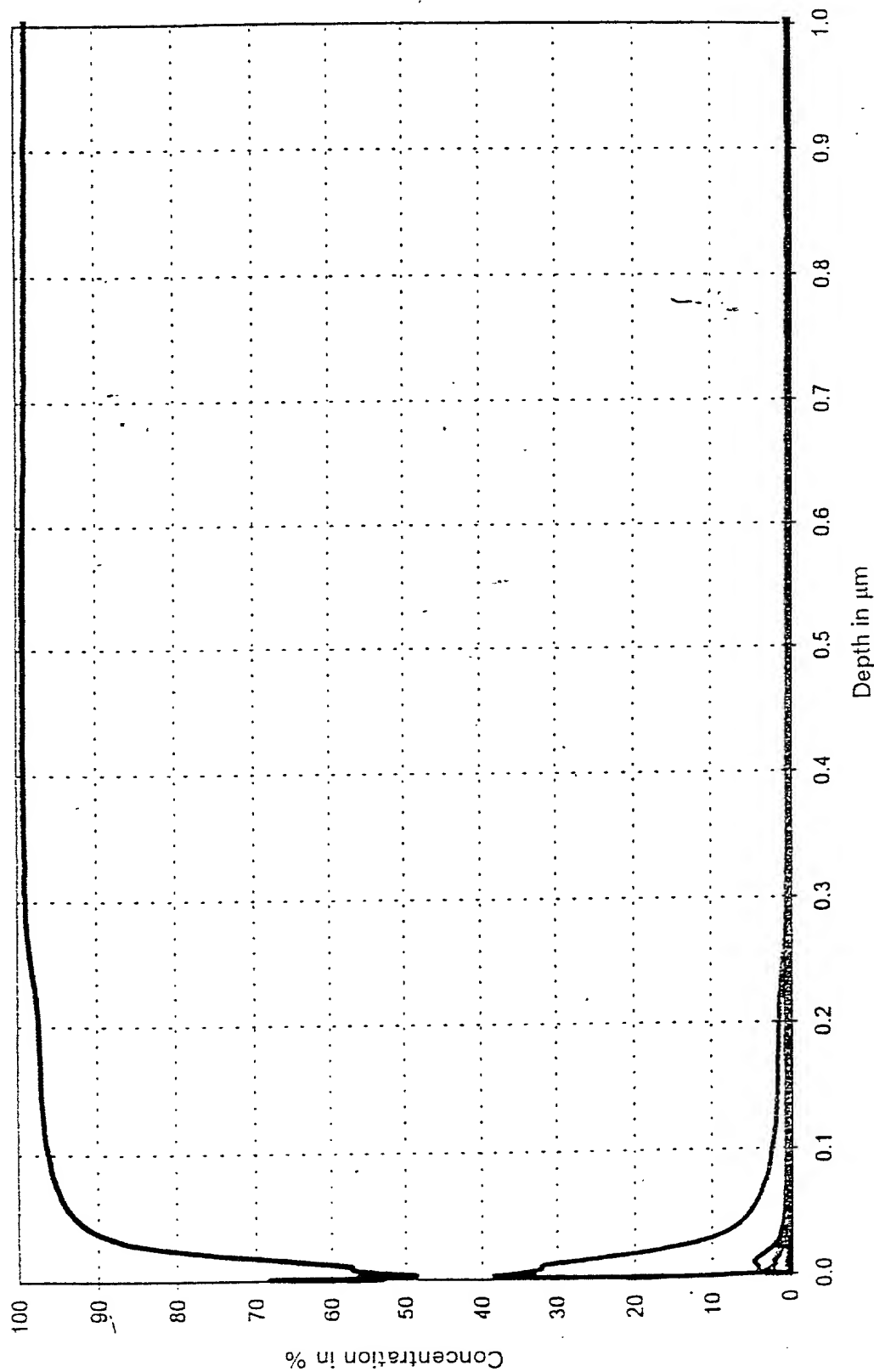
Sample 7, Measurement Position A

TOE Diagram 25540650

Diagram 1

Sample 7, Measurement Position B

FIG. 29



—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

FIG. 30

Sample 7, Measurement Position B

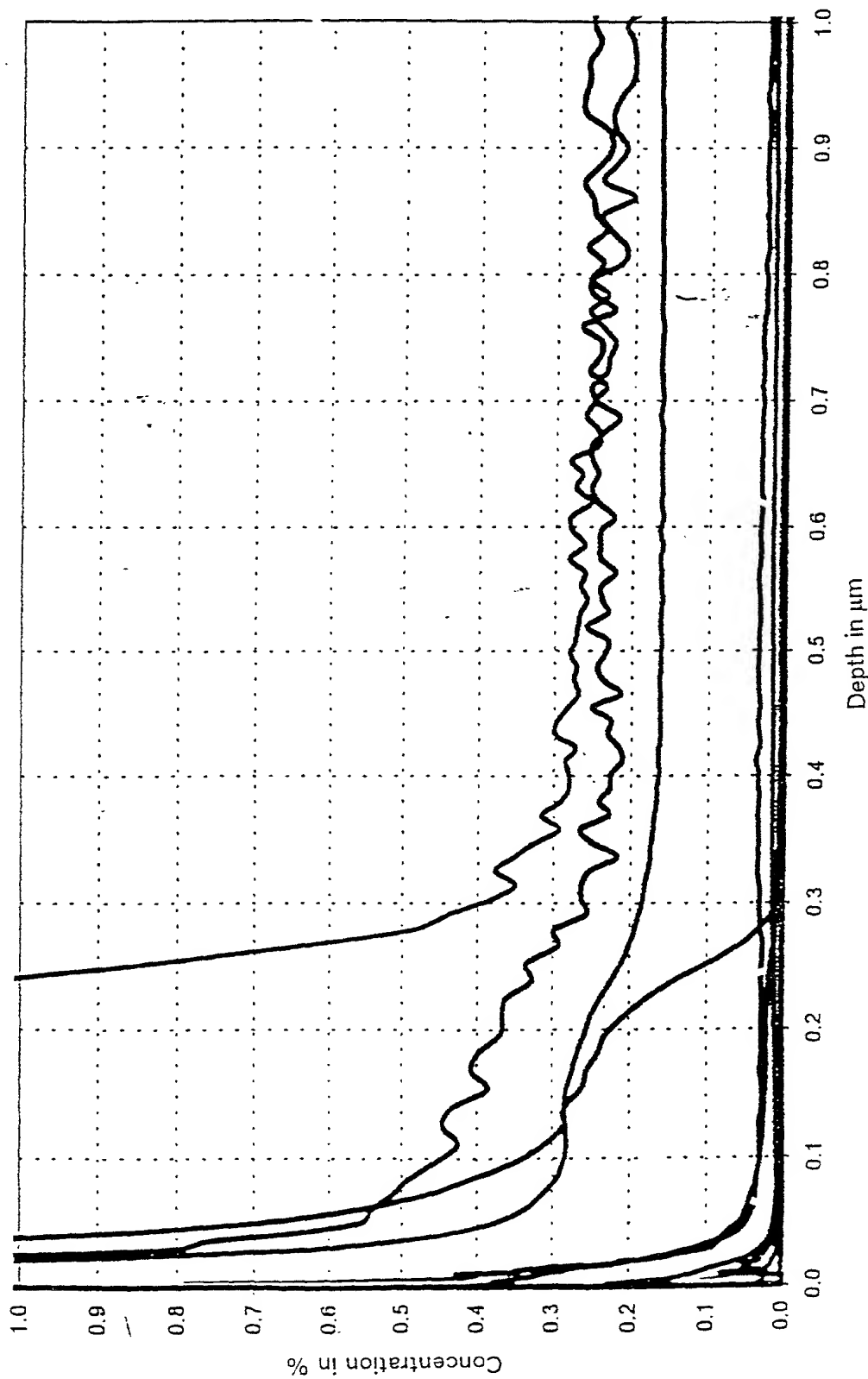
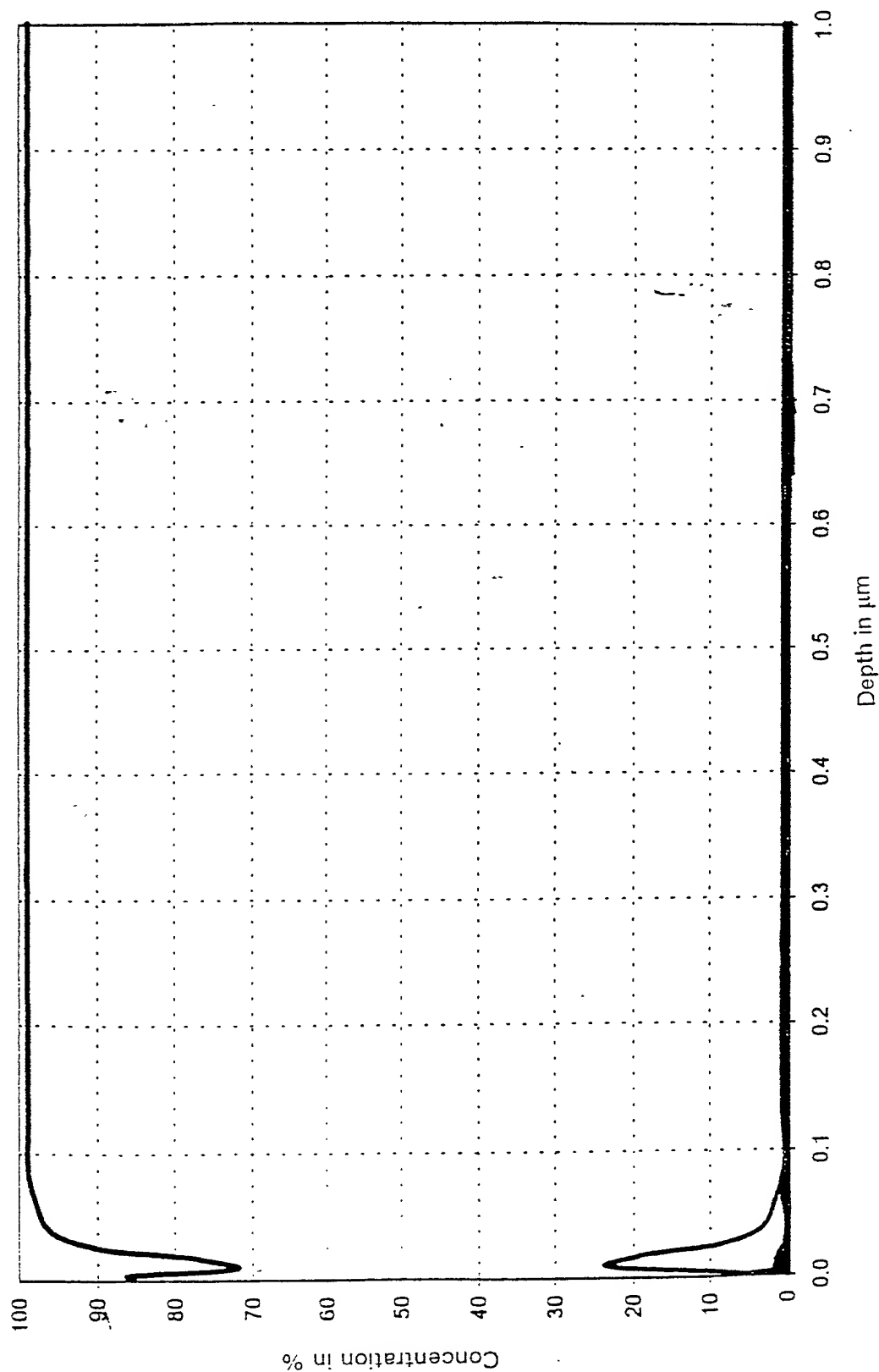


Diagram 1

FIG. 31

Sample 8, Measurement Position A

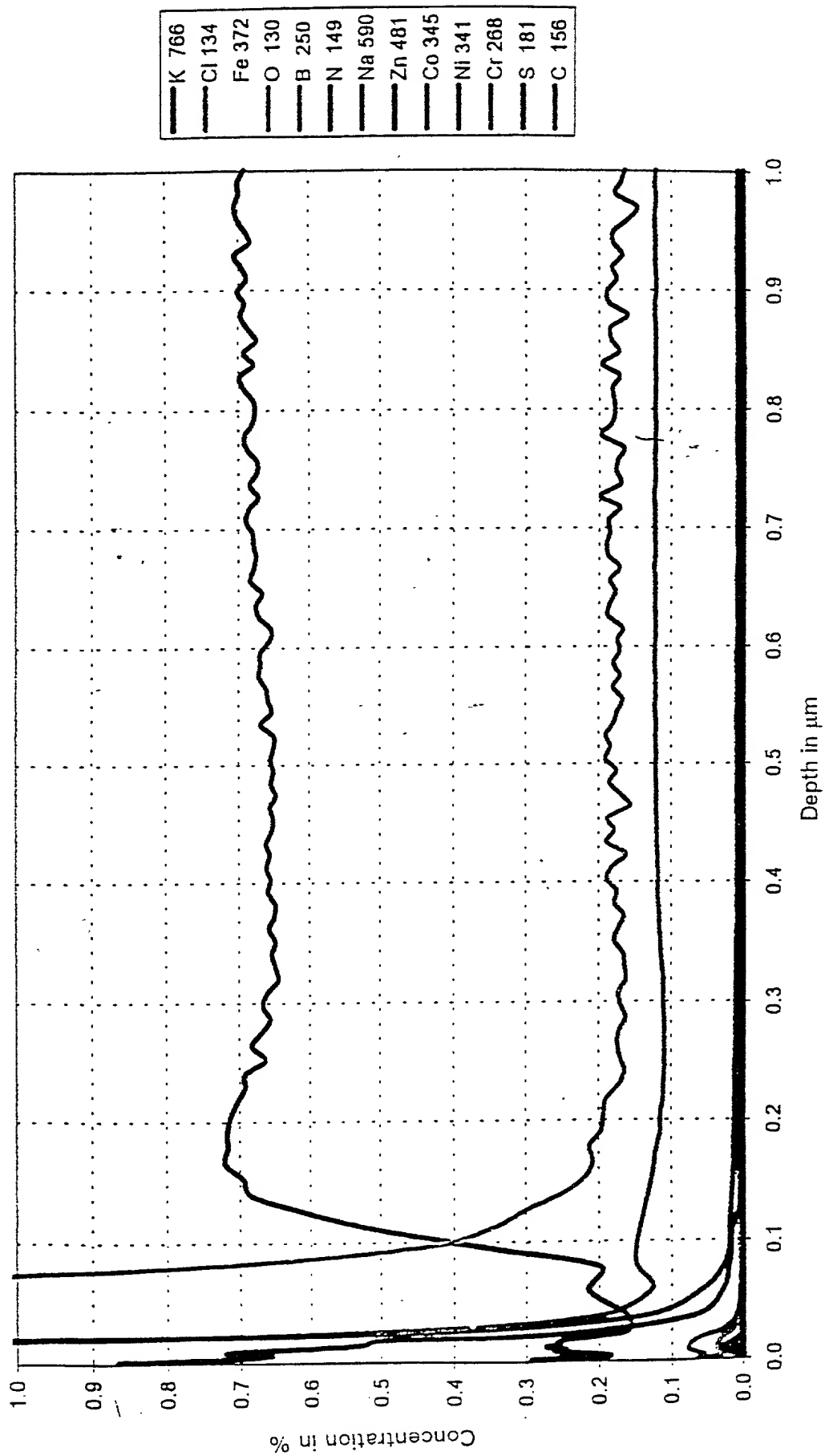


—	K 766
—	Cl 134
—	Fe 372
—	O 130
—	B 250
—	N 149
—	Na 590
—	Zn 481
—	Co 345
—	Ni 341
—	Cr 268
—	S 181
—	C 156

Diagram 2

Sample 8, Measurement Position A

FIG. 32



T E T Diagram 1 6 4 0 6 5 0

Sample 9, Measurement Position A

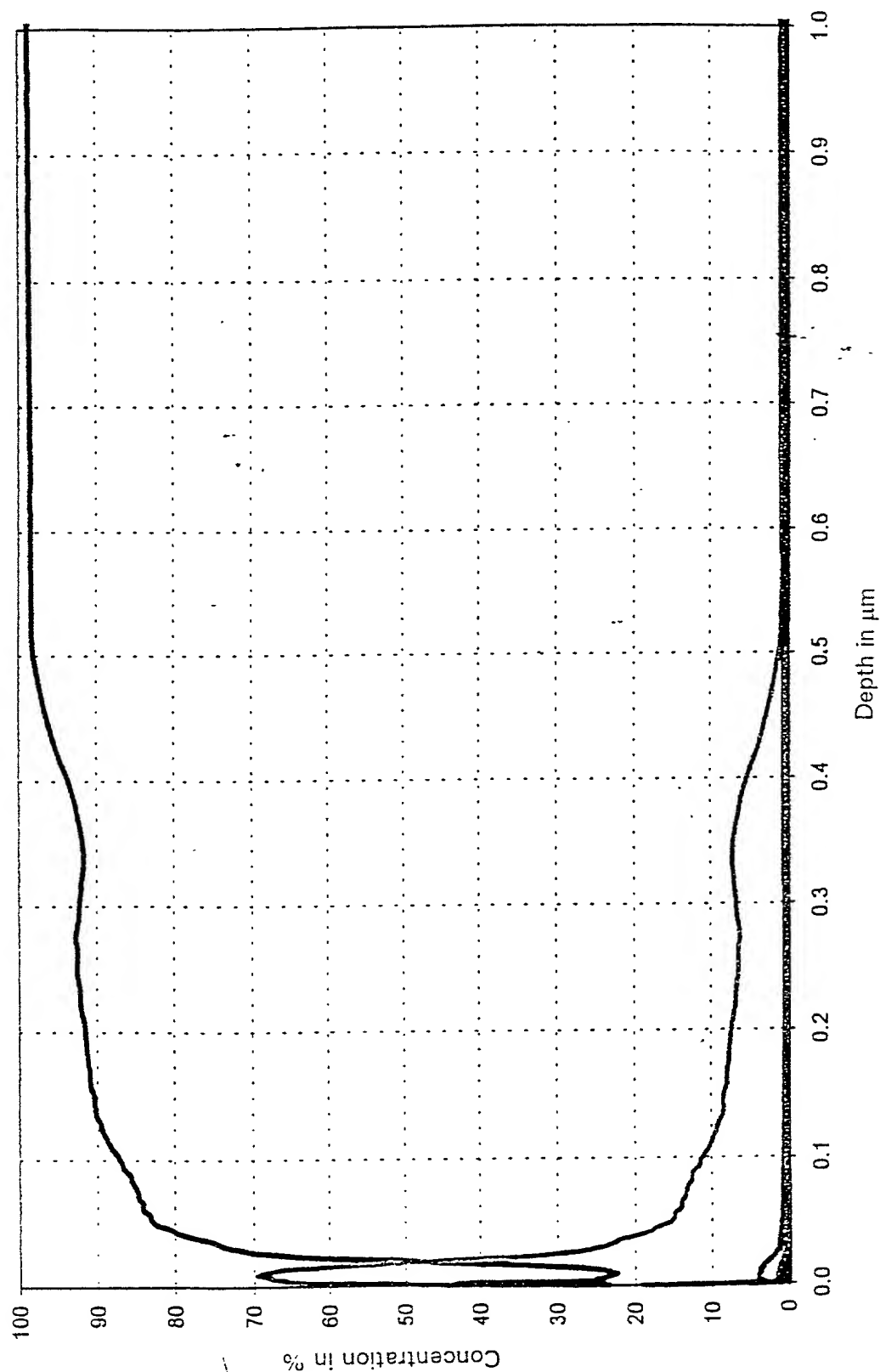


FIG. 34

Sample 9, Measurement Position A

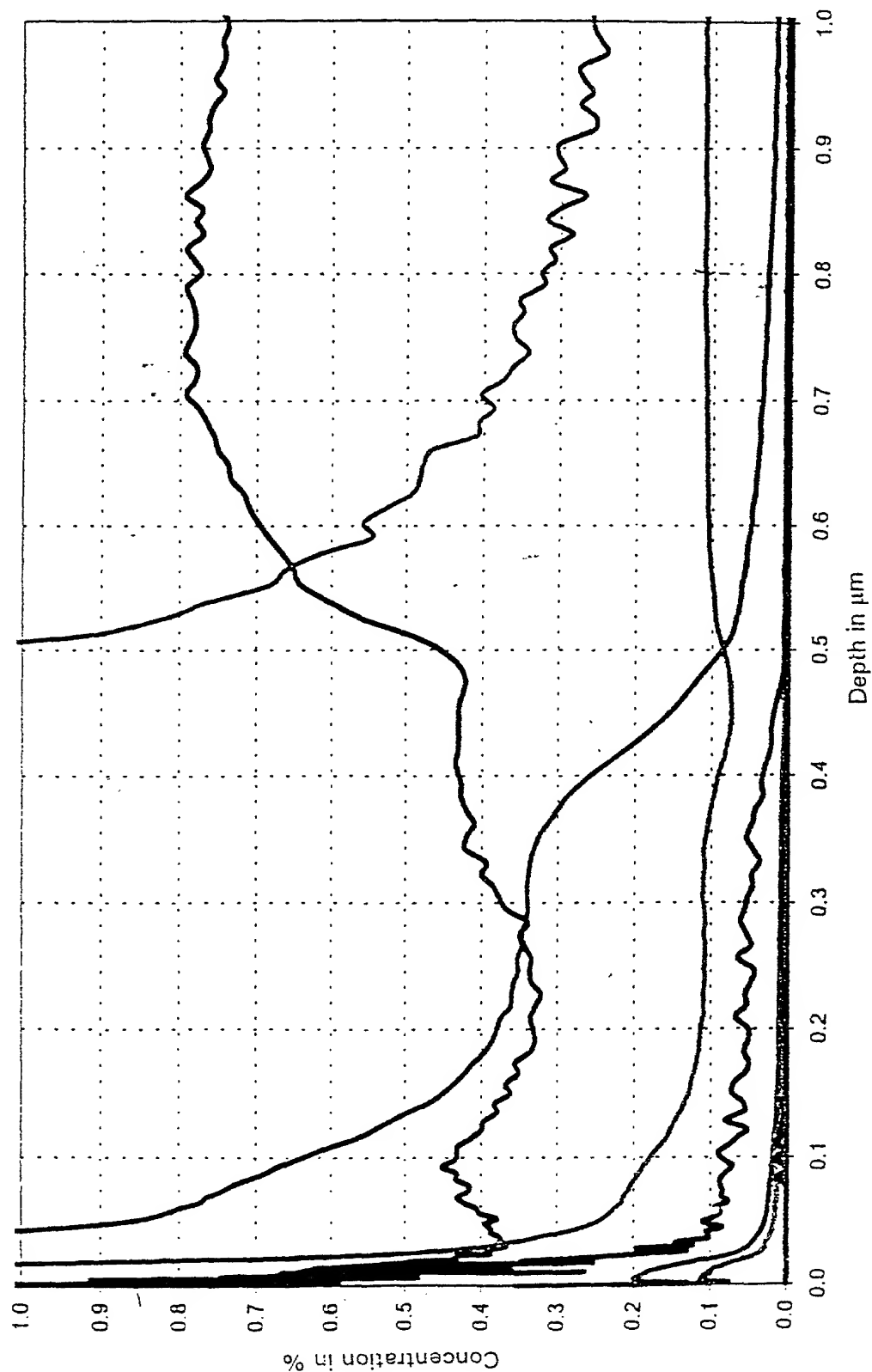


FIG. 35

Sample 9, Measurement Position B

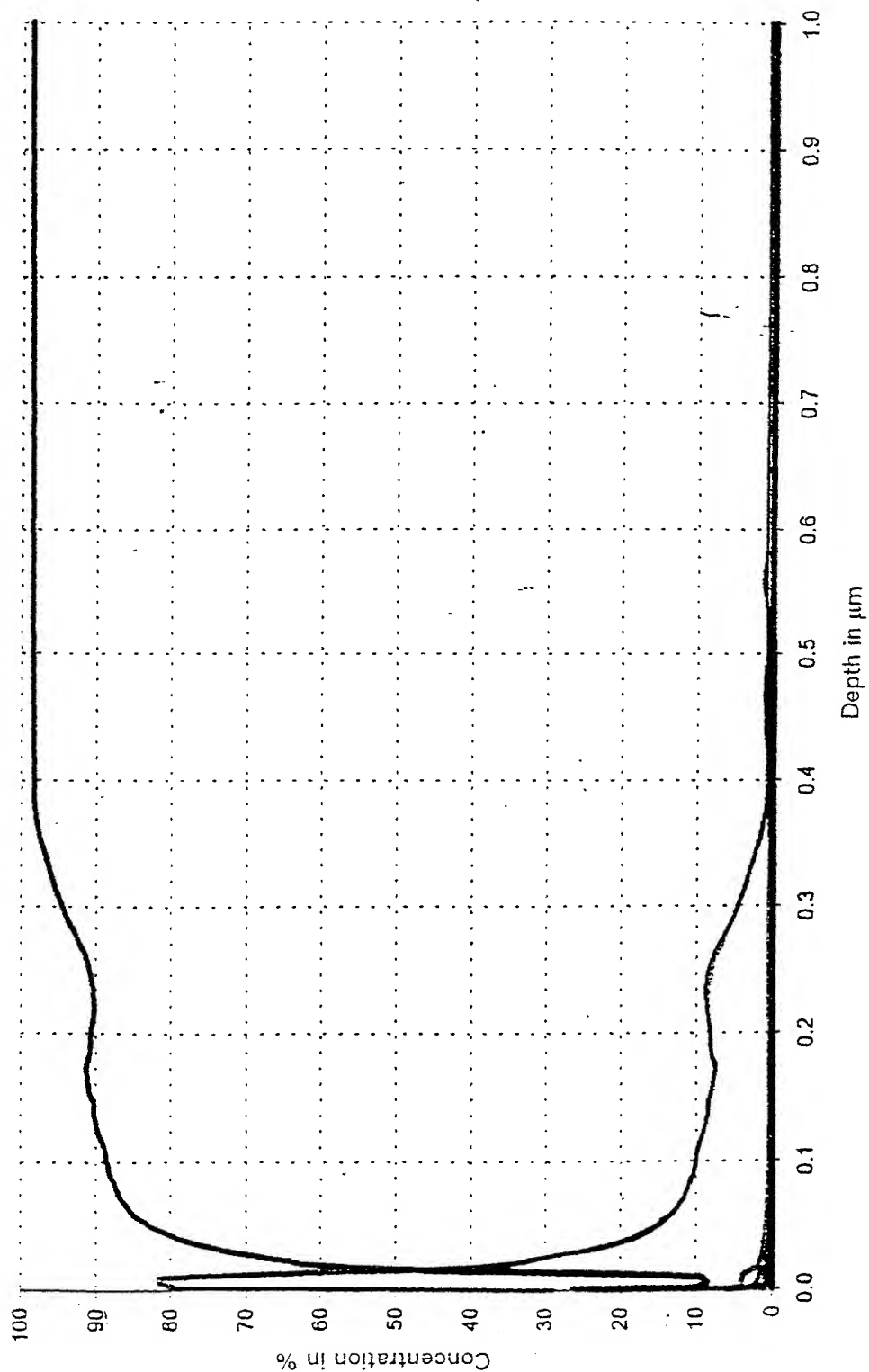


Diagram 2

Sample 9, Measurement Position B

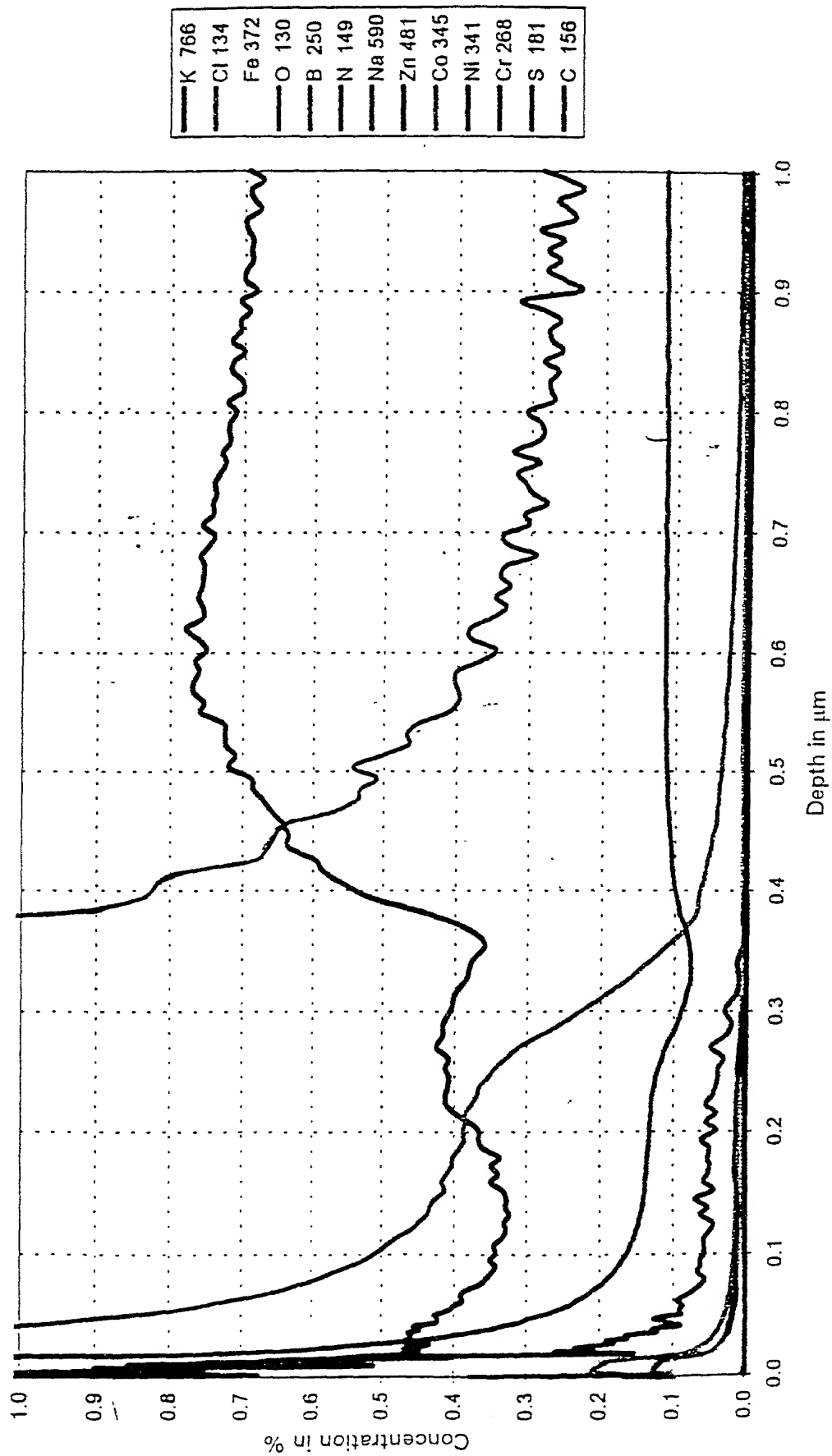


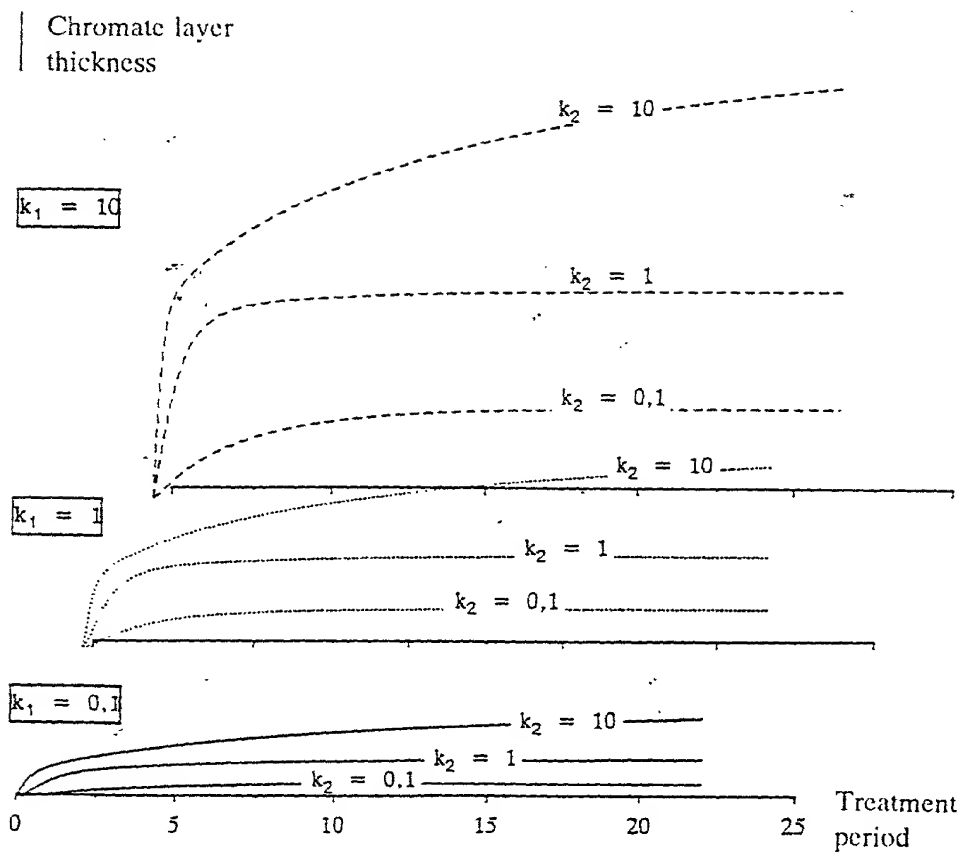
FIG. 36

FIG. 37

		Methods		SEM nm	Glow-discharge spectrometer		nm (Cr > 30%)		Sample No.
		Ellipsometry nm			nm (Cr > 1%)	with Cr (%)	chromium index	nm (Cr > Zn)	
1. Prior Art									
Yellow chromation Cr(III) + Cr(VI)		-	300	440	11	48	17	25	9
Blue chromation Cr(III)		98	60	60	8	5	0	0	8
2. Invention (Chromitization)									
60 °C Cr(III)		432	300	344	7	23	2	15	1,2,3,4,5
100 °C Cr(III)		595	-	358	10	38	22	28	6
60 °C on Zn/Fe Cr(III)		-	-	282	6	16	0	16	7
100 °C, two-fold concentration Cr(III)		953	-	-	-	-	-	-	

Fig. 38

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Computer simulation of the kinetic model of
chromate coating of zinc for various rate constants